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JUN 3 1970

NOTES ON AZTALAN SHELL–TEMPERED POTTERY 1
by Peter Bleed

CANADIAN TRADE SILVER FROM INDIAN GRAVES IN NORTHERN ILLINOIS *by James W. VanStone* 21

THE THEORY OF THE BIRDSTONE AS AN ATLATL HANDLE GRIP, REVISITED *by Robert Ritzenthaler* 31

CLOVIS AND SANDIA–LIKE POINTS FROM DANE COUNTY, WISCONSIN *by Robert Ritzenthaler* 35

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NOTES ON AZTALAN SHELL–TEMPERED POTTERY

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Because of the long history of archeological research at the site and the unusual artifacts found there, Aztalan is the most famous prehistoric site in Wisconsin. Early excavations which culminated in Barrett's 1933 report indicated clearly that Aztalan was unlike any other archeological site in Wisconsin in that it showed close architectural and ceramic parallels to Cahokia and other sites of the Mississippian tradition. Since Barrett's report was published, several authors have cited ceramic similarities as evidence that Aztalan was a "northern colony" or "transplanted village" of Mississippian culture. In making such interpretations, these authors have glossed over the many typically "non-Mississippian" ceramic items illustrated by Barrett. More recently, Barreis and Freeman (1958) have clearly shown that grit-tempered, cord marked pottery is very common at the site, and that this pottery is closely related to Late Woodland types from Wisconsin. Since Barrett's work, however, Aztalan shell-tempered pottery which looms so large in linking the site to the Mississippian tradition, has not been described in print. Before the specific relationships of Aztalan can be known, an exhaustive analysis of all the material recovered from the site will have to be made. This paper does not attempt such an enormous task. It rather seeks to give some insights into the ceramic assemblage from the site by defining a series of attributes which describe the Aztalan shell-tempered rim sherds.

The present study was based on the Aztalan pottery collections housed at the University of Wisconsin, Department of Anthropology and the State Historical Society of Wisconsin. The University collections were obtained in excavations conducted by the State Archeolo-

The author would like to thank Professor James B. Stoltman and Dr. Joan E. Freeman for their assistance with the present study and for critically reading the manuscript, and Dr. Freeman and Professor David Baerreis for making available the collections on which the study is based.

gical Survey in 1949. Sherds recovered by the Historical Society in 1964 and most of the material collected in 1967 were also included in the sample. In total there are 11,888 sherds catalogued in these collections. On the basis of the tentative identifications recorded in the site catalogues, it was determined that of the total sherd sample, 9,161 or 77.1% are grit-tempered and the remaining 2,727 or 22.9% are shell-tempered. These figures are only tentative but they show clearly that shell-tempered pottery is in the minority at Aztalan.

For this study body sherds were not examined and the analysis was limited to shell-tempered rim sherds. Thus as a first step, the rims were separated from the mass of pottery. The total sample yielded 318 rim sherds. In an attempt to reconstruct a vessel count, broken rims were mended and sherds from a single vessel were treated together. This process indicated that 263 vessels were represented in the sample. In fact, of course, most vessels were represented by only a single sherd. The next step entailed separating the rims into groups which corresponded to pottery types established by Griffin (1949) on the basis of sherds recovered from the Cahokia site which is located near East St. Louis, Illinois. This separation seemed highly subjective, but the groupings obtained in this way fit comfortably into the established Mississippian types. Until these are redefined in a more specific and detailed manner, the Aztalan pottery discussed here will fit within their bounds. When they are redefined, the categories discussed will probably form varieties of Mississippian types.

Attributes, or identifiable elements of the sherds, were isolated and defined for each of the type categories which had been established. In order to describe the type categories, the frequency of the various attributes and associations between various combinations of attributes were recorded. When the samples were large enough, the associations between various attributes were tested with a simple statistical test for chi-square which indicates the presences of non-random or apparently preferred attribute clusters (see Spaulding 1953). In most cases the rim sherds in the sample were too small to be accurately measured. When possible, the mouth diameters were determined with circular templates which were graduated in 1 cm. intervals. Maximum vessel diameters and shoulder heights were not recorded since very few rim sherds were large enough to allow for these measurements.

In all, four Mississippian pottery types and one miscellaneous category of shell-tempered vessels are represented in the Aztalan collection studied. The frequency of these categories is summarized in Table 1 and they are described in the following pages.

Powell Plain

Griffin (1949:49-50) originally defined the Powell Plain pottery

type on the basis of sherds collected at Cahokia. Pottery of the type sample was shell-tempered with fine to medium paste. It varied in color from smudged black to light buff and was usually formed into globular jars with distinct shoulders, incurving shoulder areas and rounded outcurved rolled rims. Supplementary vessel shapes including simple bowls, water bottles, beakers and large pans were also associated with the type as originally defined.

In the Aztalan collection studied for this paper, 203 rims representing 178 vessels (67.9% of total) can be placed into the Powell Plain type. An additional 21 rolled rim sherds which are too fragmentary to classify may also be included here. Since only shell tempered sherds were considered for this study, the present Aztalan sample matches the type collection in temper. Like the Cahokia material, Powell Plain sherds from Aztalan show fine to medium paste. Exterior surfaces are universally smoothed and no evidence of cord marking was noticed. Rubbing which was used to finish the surfaces also oriented the small plates of shell temper in the general plane of the vessel walls. Although there are no reconstructed or whole vessels in the sample discussed here, most of the sherds appear to have come from globular jars which had a distinct shoulder at the greatest vessel diameter. Above this point, the shoulder areas slope inward to the point of greatest constriction. At this point, the clay was turned outward to form a true rolled rim. A single loop handle was included in the present sample. It is round in cross section and is added to a round top, square rimmed black vessel which has an interior angle and a continuous curved shoulder. Maximum mouth diameters range from 52 cm. to 12 cm. with most vessels at the higher end of this range.

To further describe the Aztalan Powell Plain rim sherds, the following six sets of mutually exclusive attributes were defined.

1. Color/Surface Finish

Two general color categories, each representing about half of the total collection were identified. Of the total 178 vessels, 88 ranged from dark grey to black. The remaining 90 vessels ranged in color from red-brown to light buff. Two different surface finishes were also noted. Most of the collection (130 vessels) showed a smoothed dull exterior surface. This was unlike the polished surfaces which were seen on approximately 26% (48) of the vessels. In the original type definition Griffin suggests that a continuum could be established between polished and dull surfaces. No such continuum was noted in the Aztalan collection. Plain and polished sherds were easy to distinguish, although some of the heavily weathered sherds which were included in the dull category may have had polished exteriors. Color and surface finish

were combined to form four attributes:

a. Plain Black. The rims of 67 vessels (76 sherds) had smoke-blackened exteriors which ranged in color from dark grey to black. Although the exteriors were smoothed, these sherds showed no sign of polishing.
b. Polished Black. Twenty-six sherds representing 21 vessels had dark black exterior surfaces which showed fine striation. These were apparently made by rubbing the surface with a narrow polishing tool. All but the most heavily weathered sherds in this category reflected light. No black sherds showed definitely slipped surfaces.
c. Plain Buff. Sixty-three vessels (71 sherds) are red to light buff in color and show smoothed but unpolished surfaces. A few of the heavily weathered sherds may have been slipped, but it is impossible to positively identify an added slip on any sherds in this category.
d. Polished Red. This category consists of 27 vessels represented by 30 sherds which show polishing marks, reflect light and range in color from brown-red to orange. Nearly all of these sherds have a thin exterior layer of clay which is either the result of extensive polishing or an intentional slip. A very few sherds (3 representing 3 vessels) show smoke smudged areas on otherwise red surfaces.

The frequency of the four surface finish attributes is reviewed in Table 2a which shows that plain unpolished pottery, either black or buff, is most characteristic of Aztalan Powell Plain pottery.

2. Rim Roll

All Powell Plain jars snow a true rolled rim; that is the rim is curved directly outward at the point of greatest constriction. Except for the angle at the point of constriction, the vessels have no true neck. An arbitrary division was made between rims:

a. Those which were rolled 90° or more as measured from the immediately adjacent portion of the shoulder area.
b. Those which were rolled less than 90° as measured in the same way.

As shown in Table 1b, rims rolled 90° or more were found on more than 75% of the vessels studied (130 vs. 48 vessels, 146 vs. 57 sherds as shown in Table 2b).

TYPE	Vessel Count number	percent	Sherd Count number	percent
Powell Plain	178	67.7	203	63.8
Ramey Incised	21	8.0	36	11.3
Unassigned Rolled Rim	21?	8.0	21	6.6
Monk's Mound Red	11	4.2	19	6.0
Cahokia Cord Marked	1	.4	1	.3
Bowls	13	4.9	18	5.7
Everted Lip Jars	12	4.6	14	4.4
Beakers	4	1.5	4	1.3
Plate	1	.4	1	.3
Applique Design	1	.4	1	.3
	263	100.1	318	100.0

Table 1
Frequency of Aztalan Shell-Tempered Ceramic Categories

3. Rim Edge Form

The rim edge is defined here as the top edge (not surface) of the rim. Two forms were defined:

a. Angle top rims occur when the rim interior (fig. 1) meets the lip in a distinct angle. Rim interiors, from the top edge to the interior point of greatest constriction, were essentially always slightly rounded. Angle top rims seem to have been the preferred form since they are found on 65% or 117 of the vessels (132 sherds) in the total collection (Table 2c).

b. Round rim edges show no distinct angle between the interior rim and the lip. Rather, the two round together with no distinct boundary. Sixty-one vessels or 71 sherds had round top rims.

4. Form of Interior Constriction

As noted above, the greatest interior constriction was always the point of juncture between the shoulder area and the outcurved rim interior. A division was made between interiors:

a. Angle interior, which occurs when the rim interiors meets the interior of the shoulder area in a distinct angle.

b. Round interiors, which have the rim interiors rounding into the interior of the shoulder area with no distinct single point of direction change (fig. 1).

Angle interiors were by far the most common of the two types, being present on over 90% (161 vs. 11 vessels or 190 vs. 13 sherds) of

the sample. We may thus assume that angle interiors were preferred by Aztalan potters.

5. Rim Shape

At the risk of over generalization, two basic rim shapes were defined:

a. Square rims may have rounded edges, but they show three distinct sides. The rim interior and exterior are approximately parallel and are joined by a lip which is perpendicular to them (fig. 1). Square rims are present on 122 of the vessel (140 sherds) studies.

b. Triangular rims show only two sides with the rim exterior sloping upward to meet the interior at the rim edge. They

A.	Vessel Count	Sherd Count
Plain Black	67	76
Polished Black	21	26
Plain Buff	63	71
Polished Red	27	30
B.		
Rim Rolled more than 90°	130	146
Rim Rolled less than 90°	48	57
C.		
Angle Top Rim	117	132
Round Top Rim	61	71
D.		
Interior Angle	167	190
Interior Round	11	13
E.		
Square Rim	122	141
Triangular Rim	56	62
F.		
Straight Shoulder	32	36
Partial Straight	71	78
Curved Shoulder	75	89

Table 2
Frequency of Aztalan Powell Plain Attributes

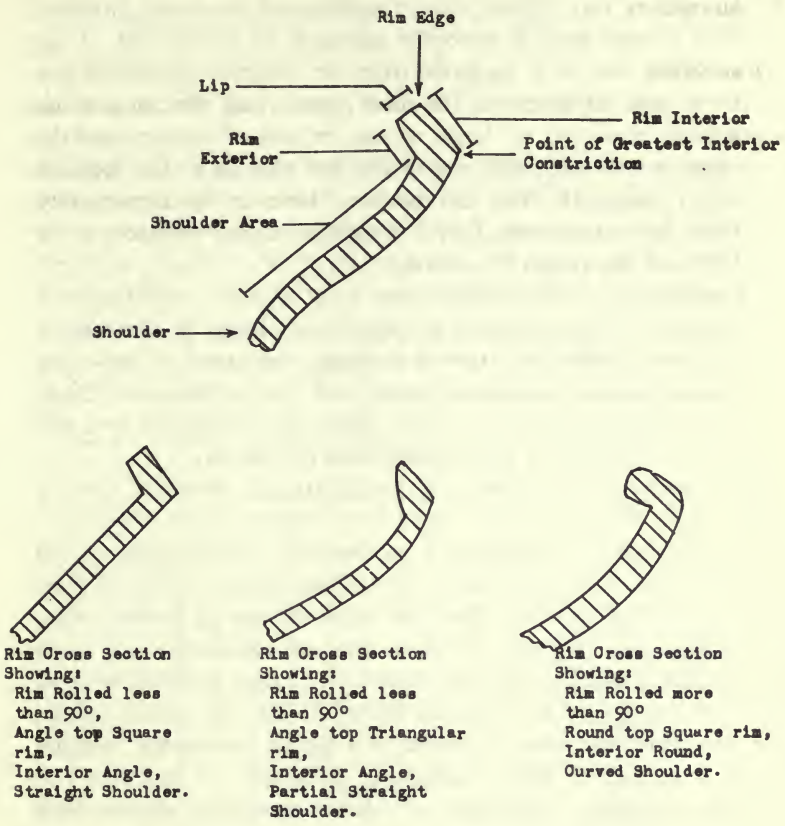


Figure 1
Terms used to describe Powell Plain and Ramey Incised Jars

thus lack a lip. Triangular rims are present on 56 of the vessels (62 sherds) studied (Table 2).

6. Shoulder Area Form

The shoulder area is defined as the inward sloping vessel section which is located between the shoulder and the point of greatest constriction. Three shoulder area forms were noted (fig. 1).

a. Straight shoulder areas run from the point of greatest constriction to the shoulder in a direct straight line. This type of shoulder area occurred on 32 vessels or 17.9% of the total sample (36 sherds). Maximum thickness on straight shoulders occurs near the rim. It ranges from 4 mm. to 9 mm.

b. Partial straight shoulders are composite forms which have a

straight or very slightly curved section near the vessel shoulder. This straight section generally accounts for 2/3 to 3/4 of the shoulder area. It is separated from the rest of the shoulder area by a fairly sharp curve. The short section near the rim is either straight or curved. On larger vessels, the area of the curve and the upper section are thickened so that the exterior of the shoulder area is straighter than the interior. Maximum thicknesses vary from 3mm. to 9 mm. Partial straight shoulders were seen in 71 (39%) of the vessels (78 sherds).

c. Continuous curved shoulder areas form an even curve from the shoulder to the rim with no significant change in the rate of curvature. Continuous curved shoulder areas tend to show uniform thickness throughout their total length. Maximum thickness ranges from 4mm. to 9mm. This style of shoulder area was seen on 75 (40%) of the vessels studied (89 sherds).

The dominance of curved and partial straight shoulder areas as seen in Table 2 indicates that they were the preferred forms.

In an attempt to determine if any specific combinations of the above attributes were preferred by the Aztalan makers of Powell Plain pottery, statistical tests for chi-square were run on all possible attribute combinations. The data for these tests are contained in the lower part of Table 3 which shows the occurrence of each attribute with all others. The results of the tests are shown in the top portion of the chart. Combinations which occurred in a highly non-random manner (greater than .01, or with a statistical probability of less than 100 to 1 of showing such a distribution by chance alone) are indicated with a plus sign. On the basis of these tests, we may conclude that certain intra-type tendencies can be identified in the Powell Plain vessels of Aztalan. First, most of the potters preferred rims rolled more than 90°. When they made such a rim, they also preferred round top square rims and partial straight shoulders. There was also an identifiable tendency for vessels with rims rolled more than 90° to be made with plain black surfaces. Vessels which were made with rims rolled less than 90° are associated with and were apparently preferred with traingular rims and continuous curved shoulder areas. Similar traits were also preferred on polished red vessels. Finally, although the statistics are not positive, it appears that analysis of a larger sample would show a significant association between round interiors and round lips.

Ramey Incised

The Ramey Incised type was defined by Griffin (1949:51) as the decorated companion of Powell Plain. In the Aztalan collection being

Plain Black	Rim Rolled > 90°	Polished Red	Plain Buff	Polished Black	Plain Black	
20 / 25	30 / 32	11 / 13	21 / 46 / 53	6 / 8	67 / 68	22 / 25
8 / 11	10 / 12	3 / 3	6 / 6	0 / 0	21 / 26	10 / 23
30 / 35	24 / 25	12 / 14	20 / 24	5 / 5	58 / 66	25 / 27
17 / 18	7 / 9	6 / 6	9 / 9	0 / 0	27 / 30	4 / 6
33 / 40	69 / 76	26 / 28	33 / 35	7 / 9	123 / 137	54 / 64
42 / 49	2 / 2	6 / 8	23 / 27	4 / 4	44 / 53	7 / 7
59 / 69	53 / 54	20 / 24	44 / 49	0 / 0	119 / 134	
16 / 20	18 / 24	12 / 12	12 / 13	11 / 13	48 / 56	
73 / 85	71 / 78	24 / 28	53 / 59			
2 / 4	0 / 0	8 / 8	3 / 3			
53 / 67	48 / 53	21 / 25				
22 / 4	23 / 25	11 / 11				

Rim Rolled < 90°	Rim Rolled > 90°	Polished Red	Plain Buff	Polished Black	Plain Black	
12 / 15	55 / 61					Plain Black
3 / 3	18 / 23					Polished Black
19 / 25	44 / 46					Plain Buff
14 / 14	13 / 16					Polished Red
					+	Rim Rolled > 90°
		+				Rim Rolled < 90°
						Angle Top Rim
	+					Round Top Rim
						Interior Angle
						Interior Round
	+					Square Rim
+						Triangular Rim
	+					Straight Shoulder
+						Partial Straight Shoulder
						Continuous Curved Shoulder

Angle Top Rim	Round Top Rim	Interior Angle	Interior Round	Square Rim	Triangular Rim	Straight Shoulder	Partial Straight Shoulder	Continuous Curved	
45 / 51	22 / 25	67 / 68	6 / 8	46 / 53	21	11 / 13	30 / 32	20 / 25	Plain Black
11 / 13	10 / 23	21 / 26	0 / 0	15 / 20	6 / 6	3 / 3	10 / 12	8 / 11	Polished Black
38 / 44	25 / 27	58 / 66	5 / 5	43 / 47	20 / 24	14 / 12	24 / 25	30 / 35	Plain Buff
23 / 24	4 / 6	27 / 30	0 / 0	18 / 21	9 / 9	6 / 6	7 / 9	17 / 18	Polished Red
78 / 84	54 / 64	123 / 137	7 / 9	97 / 121	33 / 35	26 / 28	69 / 76	33 / 40	Rim Rolled > 90°
49 / 58	7 / 7	44 / 53	4 / 4	25 / 30	23 / 27	6 / 8	2 / 2	42 / 49	Rim Rolled < 90°
		119 / 134	0 / 0	73 / 83	44 / 49	20 / 24	53 / 54	59 / 69	Angle Top Rim
		48 / 56	11 / 13	49 / 58	12 / 13	12 / 12	18 / 24	16 / 20	Round Top Rim
				114 / 131	53 / 59	24 / 28	71 / 78	73 / 85	Interior Angle
				8 / 10	3 / 3	8 / 8	0 / 0	2 / 4	Interior Round
	+					21 / 25	48 / 53	53 / 67	Square Rim
+						11 / 11	23 / 25	22 / 4	Triangular Rim
									Straight Shoulder
									Partial Straight Shoulder
									Continuous Curved Shoulder

Table 3
Association of Powell Plain Attributes
lower number = vessel count
upper numer = sherd count
pluses (+) indicate positive non random association (.01)

considered, only 36 sherds representing 27 vessel (8.0% of the total sample) fall into this type. These vessels differ from those of the Powell Plain type in that they have had a design added to the exterior of the shoulder area. No polished black decorated sherds were noted although some were so heavily weathered that it was impossible to determine what their original finish may have been. With this exception, the attributes defined for the Powell Plain type may be used to describe the

	Frequency	Black	Plain Buff	Polished Red	Rim Rolled >90°	Rim Rolled <90°	Angle Top Rim	Round Top Rim	Interior Angle	Interior Round	Square Rim	Triangular Rim	Straight Shoulder	Partial Straight Shoulder	Curved Shoulder	Trailed Designs	Incised Designs	Engraved Designs
Black																		
Plain Buff																		
Polished Red																		
Rim Rolled > 90°	25 15	12 8	11 5	2 2														
Rim Rolled < 90°	11 6	0 0	5 3	6 3														
Angle Top Rim	26 17	10 6	9 7	7 4	15 11	11 6												
Round Top Rim	10 4	2 2	7 1	1 1	10 4	0 0												
Interior Angle	34 19	11 7	16 8	7 4	23 13	11 6	26 17	8 2										
Interior Round	2 2	1 1	0 0	1 1	2 2	0 0	0 0	2 2										
Square Rim	20 14	6 6	11 5	3 3	18 12	2 2	10 10	10 4	18 12	2 2								
Triangle Rim	16 7	6 2	5 3	5 2	7 3	9 4	16 7	0 0	16 7	0 0								
Straight Shoulder	3 3	1 1	0 0	2 2	2 2	1 1	2 2	1 1	2 2	1 1	3 3	0 0						
Partial Straight	20 9	6 3	73 5	1 1	4 2	16 7	12 7	8 2	20 9	0 0	12 6	8 3						
Curved Shoulder	13 9	5 4	3 3	5 2	7 6	6 3	12 8	1 1	12 8	1 1	5 5	8 4						
Trailed Designs	14 11	8 5	5 5	1 1	13 10	1 1	12 9	2 2	13 10	1 1	8 8	6 3	1 1	9 6	4 4			
Incised Designs	18 7	1 1	10 2	7 4	9 3	9 4	10 3	8 2	17 6	1 1	10 4	8 3	2 2	11 3	5 2			
Engraved Designs	4 3	3 2	1 1	0 0	4 3	0 0	4 3	0 0	4 3	0 0	2 2	2 1	0 0	0 0	4 3			
Chevron Pattern	8 8	3 3	5 5	0 0	7 7	1 1	6 6	2 2	7 7	1 1	7 7	1 1	1 1	3 3	4 4	7 7	0 0	1 1
Chevron w/ Horizontal	8 5	1 1	1 1	6 3	3 3	5 2	8 5	0 0	8 5	0 0	3 3	5 2	1 1	2 2	5 2	3 3	5 2	0 0
Scrolls	17 6	5 2	10 2	2 2	13 4	4 2	9 4	8 2	16 5	1 1	9 3	8 3	1 1	15 4	1 1	4 1	13 5	0 0
Irregulars	3 2	3 2	0 0	0 0	3 2	0 0	3 2	0 0	1 1	2 1	1 1	2 1	0 0	0 0	3 2	0 0	0 0	3 2

Table 4
Frequency and Association of Aztalan Ramey Incised Attributes

shape and surface finish of all Ramey Incised vessels. The occurrence of these attributes and the others which are about to be discussed is shown in Table 4.

1. Decorative Technique

The decoration on Aztalan, Ramey Incised pottery was executed in one of three ways:

a. Trailed lines were made by drawing a blunt tool through the surface of soft clay. The grooves formed in this way are wider

than they are deep and have round bottoms. Sometimes small ridges of clay were built up along the margins of the trailed lines and occasionally the trailing formed cameos on the vessel interior. Trailed lines were present on 14 sherds which came from 11 different vessels.

b. Incised lines were drawn with a tool which actually removed a part of the vessel surface. They generally show a "V" shaped cross-section and are deeper than they are wide. Incised lines were apparently made after the vessel was quite dry, and they never showed cameo impressions. Seven vessels (18 sherds) had incised decorations.

c. Engraved lines, which are found on three vessels (four sherds) of the present sample, were scratched into the vessel surface after firing had been completed. Engraved lines were quite crude, showing irregular, rough edges and generally penetrating into the reduced core of the vessel wall.

2. Decorative Motif

The small number of decorated sherds and their small size makes it impossible to present a detailed inventory of the patterns used. Four general types of motifs can be identified:

a. Chevron patterns, consisting of concentric "V's" or parallel oblique lines, occur on 8 vessels (8 sherds).

b. Chevron patterns on 5 vessels (8 sherds) were interspersed with and connected by parallel horizontal lines.

c. Scroll patterns occurred on 5 vessels represented by 10 sherds. These sherds are so small that it is impossible to determine the exact patterns involved. Interlocking series of single scrolls and concentric scrolls were both apparently used.

d. Irregular, crude curvilinear lines were engraved on two vessels (two sherds).

Because of the small sample size which makes statistical analysis impractical, it is difficult to point out significant clusters of attributes for the Ramey Incised type. Table 4 shows that the same formal attributes which were favored for Powell Plain vessels were preferred on decorated vessels. To determine if attributes which tend together on Powell Plain jars are commonly associated with one another on decorated vessels, chi-square tests were run on the association of formal attributes within the combined population of plain and decorated vessels. These tests show that decorated vessels have the same attribute clusters (e.g. round rim top, square rim, and partial straight shoulder area associated with rims rolled 90° or more, continuous curved shoulder areas and triangular rims associated with rims rolled less than 90°)

as those characteristic of the Powell Plain type. In other words, in terms of form, the two types are identical.

Analysis of the present sample has not pointed up any definite associations between formal and decorative attributes. Engraving was used to make the irregular designs but except for this, it appears that there were no preferred techniques for making any of the various motifs used to decorate the pots.

Monk's Mound Red

The Monk's Mound Red type was defined by Griffin (1949:52-3) to include red painted spherical jars, bowls and plates from Cahokia. The temper of the type sample consisted of large quantities of crushed limestone along with fragments of mussel shell. In the Aztalan collections, 19 sherds, representing 11 nearly spherical jars, fit into the original type definition at least in terms of vessel shape and surface finish. Other possible examples of the type will be discussed with the miscellaneous vessels. Most of the sherds included in this category have red slipped exterior surfaces. The few sherds which show no slip are all heavily weathered so that it does not seem unreasonable to presume that they were originally slipped. The paste of all these sherds is not significantly different from that seen in other shell tempered pots in the collection. Shell fragments seem to have served as the main aplastic agents in all cases. A few sherds may contain small amounts of finely crushed limestone (and in one case, sand) in addition to shell fragments. These are, however, in a distinct minority. Wall thickness ranged from 4 mm. to 7 mm., and the measurable mouth diameters ranged from 14 cm. to 18 cm.

The 11 vessels included in the Monk's Mound Red type all had continuously rounded sides with the greatest construction at the lip. All these jars were slipped on the exterior with the added coating of clay extending just past the lip to the vessel interior. Seven attributes were defined to further describe the vessels.

1. Surface Finish

a. Seven vessels represented by 13 sherds were red-brown with polished slipped exterior surfaces. The polishing was finely done so that it is hard to detect striations caused by the polishing tool.

b. Two sherds from different vessels have chalky deep red unpolished surfaces.

c. Two vessels (two sherds) have polished surfaces which show zones of two different colors. One sherd shows polished red areas interspersed with areas of buff slip. The sherd is too small

to determine the exact pattern of zoning, but the buff zone apparently formed a narrow band around the vessel lip. There were also triangular buff colored zones on the vessel wall. Another sherd has dull buff slip added in zones which were outlined with broad trailed lines.

2. Rim Form

a. Six of the spherical jars, represented by 14 sherds, showed double thickened rims which apparently had a layer of clay added to the rim interior, and the change in thickness is only apparent on the rim interior. These vessels all have rounded lips.

b. The remaining jars (5 vessels 5 sherds) have unthickened rims with rounded lips.

3. Decoration

a. A single sherd is decorated with an oblique row of punctates. The punctates are 3 mm. in diameter and were apparently made with a reed or a hollow tube since each shows a raised center.

	Frequency	Polished Red	Chalky Red	Zoned Slipping	Doubled Rim	Unthickened Rim	Punctates	Trailed Line Design
Polished Red	13 / 7							
Chalky Red	2 / 2							
Zoned Slipping	4 / 2							
Doubled Rim	14 / 6	10 / 4	0 / 0	4 / 2				
Unthickened Rim	5 / 5	3 / 3	2 / 2	0 / 0				
Punctates	1 / 1	1 / 1	0 / 0	0 / 0	1 / 1	0 / 0		
Trailed Line Design	1 / 1	1 / 1	0 / 0	1 / 1	1 / 1	0 / 0	0 / 0	
Rim Indentation	2 / 1	2 / 1	0 / 0	0 / 0	2 / 1	0 / 0	0 / 0	0 / 0

Table 5
Frequency and Association of Aztalan Monk's Mound Red Attributes

The punctates are located on the thickened portion of a doubled rim and perhaps for this reason they show no cameo.

b. Another single sherd shows a small section of a curving broad trailed line. The line is 4 mm. wide and quite shallow.

c. One vessel represented by two sherds has a deep trailed line or indentation on the exterior surface at a point which corresponds to the end of the rim thickening on the vessel interior.

Table 5 represents the associations of the attributes of Monk's Mound Red jars. The sample is far too small to allow any positive statements on the clustering of these attributes. Perhaps analysis of a large sample may show that punctates or trailed decoration were restricted to vessels with doubled rims.

Cahokia Cord–Marked

A single large rim sherd from Aztalan fits into the Cahokia Cord-Marked type. This sherd is from a rolled rim, shouldered, round-bottom vessel. In shape it is identical with several Powell Plain sherds with a square angle top rim rolled more than 90°, an interior angle, and a partial straight shoulder area. The exterior below the rim exterior is covered with Z twist cord wrapped stick rolling. The diameter at the interior point of greatest constriction is 18 cm. The interior surface is smoothed. The sherd is tempered with very fine shell fragments and also may contain some fine particles of grog.

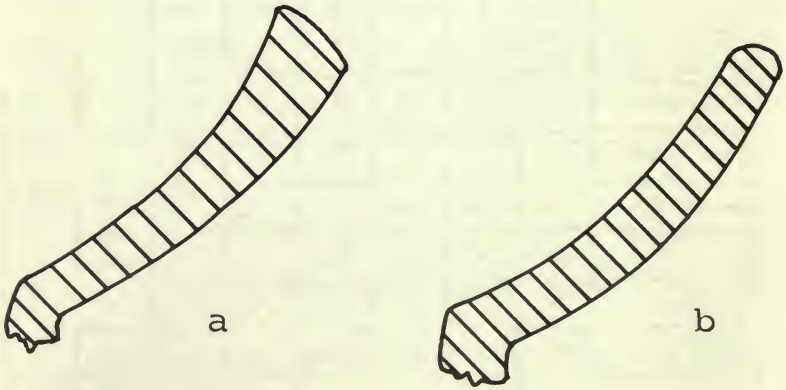


Figure 2
Cross Sections of Unrolled Rim Jars
a. Thickened Interior Beveled Rim
b. Unthickened Round Rim

Miscellaneous

Included in the collection studied for this paper were five categories of vessels which could not be positively linked to any of the Cahokia types discussed thus far.

A. SHOULDERED JARS WITH UNROLLED RIMS

This group of 14 rim sherds, which represents 12 different vessels, is probably related to the Powell Plain type. Vessels in this category are globular jars which have a fairly distinct shoulder at the greatest diameter. The shoulder area slopes inward past this point and ends in a slightly everted but unrolled lip (fig. 2). The surface finishes and the shoulder area forms seen on these jars may be described in terms of the attributes defined for the Powell Plain type. Two more sets of attributes were defined to describe other features of these vessels. The

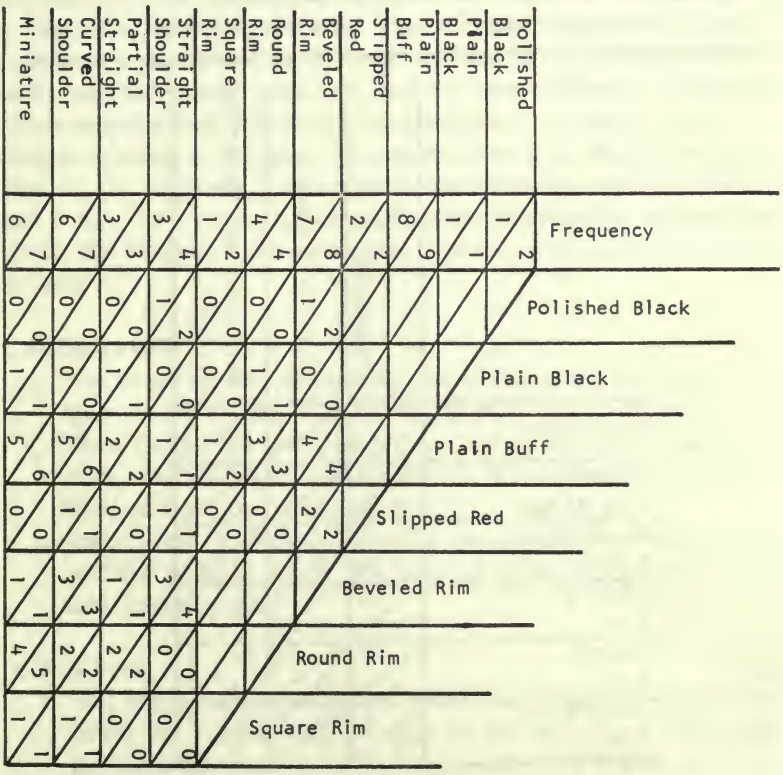


Table 6
Frequency and Association of Unrolled Rim Jars Attributes

frequency and associations of these attributes are summarized in Table 6.

1. Rim Form

a. Seven vessels (8 sherds) have interior beveled rims. The interior and exterior surfaces of the shoulder areas of these vessels parallel one another until they reach a point a few millemeters below the rim edge. The exterior surface continues past this point with no change in direction. The rim interior, however, turns slightly outward at this point and meets the exterior in an angular rim edge (fig. 2). The turn in the rim interior generally forms a distinct angle.

b. Round rims are seen on four sherds from four different vessels. These sherds have both edges of the rim rounded.

c. A square rim is seen on a single vessel represented by two sherds. The rim of this vessel has a flat lip which is approximately perpendicular to the axis of the shoulder area.

	Frequency	Exterior Slipped	Interior and Exterior Slipped
Frequency		9 / 5	9 / 8
Interior Rim Ridge	2 / 1	2 / 1	0 / 0
Beveled Rim	3 / 3	2 / 2	1 / 1
Square Rim	4 / 4	1 / 1	3 / 3
Round Rim	3 / 3	0 / 0	3 / 3
Thickened Rim	6 / 2	4 / 1	2 / 1

Table 7
Frequency and Association of Aztalan Bowl Attributes

2. Vessel Size

Six of the everted rim jars (7 sherds) may be classed as miniature vessels. The maximum interior diameter of these jars ranges from 4 to 9 cm., and the maximum thickness of the shoulder area wall varies from 3mm. to 6mm. Generally these vessels are quite crudely made and show a high shoulder angle. It was impossible to accurately determine the mouth diameter of the other vessels in this category, but all seem to have been larger than 14 cm. Maximum shoulder thickness for the larger vessels ranged from 5 to 9 mm.

Once again it is impossible to isolate any definite clusters of attributes which are typical of this category.

B. BOWLS

The remains of 13 bowls evidenced by 18 sherds were included in the analyzed sample of Aztalan pottery. Both the Plain Powell and Monk's Mound Red types were defined to include bowl-forms. It was impossible to link the Aztalan bowls to one or another of these types, so they are described separately here. All these vessels have slightly convex walls which blend into round bottoms. No rim effigies are definitely associated with them, and they all have medium to fine paste which includes shell fragments. One bowl has a noticeable amount of sand in addition to the shell. Maximum diameter of the bowls ranges from 12 cm. to 20 cm., and maximum wall thickness is between 4 mm. and 7 mm. Two sets of attributes have been defined to describe the bowls. The frequency and association of these attributes is summarized in Table 7.

1. Surface Finish

a. Five bowls (9 sherds) have slipped and polished exteriors. The color of the slipped surfaces ranges from orange to red-brown. These finishes are well polished and rarely show burnishing striations. The unslipped interior surface is smoothed but not polished and buff or brown in color.

b. Eight bowls (9 sherds) have both the interior and exterior slipped and polished finish. The color of these vessels varies from dark brown to red.

2. Rim Form

a. One bowl represented by two sherds has a rounded straight rim which has a small modeled ridge on the rim interior. This ridge increases the thickness of the vessel wall from 6 mm. to 9 mm. (fig. 3).

b. Three bowls (3 sherds) have interior beveled rims like those

Figure 3
Cross Section of Aztalan Bowl Rim Forms
a. interior ridge
b. interior bevel
c. square
d. round
e. thickened

described for the everted rim jars (fig. 3).

c. Four bowls (4 sherds) have square rims with flat lips which meet both vessel surfaces at distinct angles (fig. 3).
d. Round rims are seen on three bowls represented by three sherds (fig. 3).
e. Two bowls represented by six sherds had their rims thickened by having a part of the edge rolled onto the exterior surface. (fig. 3).

A larger collection of bowls is needed before a definite statement can be made about the typical characteristics of this class. The bowls studied for this paper are more elaborately finished than most of the Powell Plain vessels discussed earlier. They seem more similar to the Monk's Mound Red jars, but the variation in the surface color seen of the bowls, and the fact that they are shell tempered makes it difficult to place them neatly in that type.

C. BEAKERS

Four straight vertical-sided beakers, each represented by a single sherd, were included in the analyzed sample. One sherd has a polished back finish on both the interior and exterior surfaces. It has a round lip. The remaining sherds all have red slipped surfaces which were apparently polished, although they are heavily weathered now. One of them has an unthickened rim with a round lip. The remaining two have double thickened rims with exterior indentations at the end of the thickened section. All are, of course, shell tempered and have smooth exteriors. Maximum diameters range from 14 cm. to 36 cm., and maximum wall thickness varies from 4 mm. to 6 mm. These beakers may belong to either the Powell Plain or Monk's Mound Red type.

D. PLATE

The only plate in the sample was represented by a single sherd.

The plate is 18 cm. in diameter and is very slightly concave. It has a round lip and a smoothed surface which is so heavily weathered that it is impossible to determine the nature of its original surface. Both the Powell Plain and Monk's Mound Red types include plates.

E. Only a single shell-tempered sherd from Aztalan has no parallels at Cahokia. This sherd is from a highly polished red slipped shouldered jar which has a slightly curved row of applique nodes running obliquely across the shoulder area. The sherd has an angle top square rim which is rolled less than 90°. The shoulder area is partially straight. The red slip, which covers the exterior of the sherd, is thicker than that seen on either Powell Plain or Monk's Mound Red jars. It shows extensive burnishing. The paste of the sherd is quite coarse and includes fairly large fragments of mussel shell. The mouth diameter of the vessel is 18 cm., and the maximum thickness of the shoulder area wall is 5 mm.

CONCLUSION

This paper has answered a few of the many questions which exist about the Aztalan ceramic assemblage. It has shown that a number of pottery types which are found at Aztalan can be favorably compared to Mississippian types from Cahokia. The Mississippian types found at Aztalan share a few attributes of temper, decorative technique, and surface finish which isolate them from the dominant grit-tempered cord-marked pottery types present at the site. Few if any attributes are found in both the grit-tempered and in the shell-tempered types. If we assume that the collections analyzed for this paper represent a random cross section of the Aztalan ceramic inventory, the study has shown that Mississippian pottery accounts for less than a quarter of the total ceramic assemblage from the site. With the exception of Powell Plain and Ramey Incised the Mississippian types present at Aztalan are distinguishable from one another on the basis of vessel form. At Aztalan, the Powell Plain and Ramey Incised types share the same formal attributes and in both, these attributes are associated with one another in approximately the same manner. Aside from the decoration on the latter, these two types appear to be identical. This study has not dealt with the exact similarities between Aztalan shell-tempered pottery and that recovered from Cahokia or other sites. Such a statement will have to wait until the Cahokia types have been defined in greater detail. Finally, the pottery studied for this paper is but a small portion of the material which has been recovered from Aztalan. The attributes and attribute clusters which have been suggested as characteristic of Aztalan shell-tempered pottery may be evaluated and amplified by an analysis of the total sample of pottery which is available from the site.

BIBLIOGRAPHY

Baerreis, David A. and J.E. Freeman
1958 "Late Woodland Pottery in Wisconsin as Seen from Aztalan," Wisconsin Archeologist, Vol. 39, No. 4, pp. 35-61.

Barrett, S.A.
1933 "Ancient Aztalan," Bulletin of the Museum of the City of Milwaukee, Vol. XIII, pp. 1-602.

Griffin, J.B.
1949 "The Cahokia Ceramic Complexes," Proceedings of the Fifth Plains Conference for Archeology, pp. 44-58.

Spaulding, Albert C.
1953 "Statistical Techniques for the Discovery of Artifact Types," American Antiquity, Vol. XVIII, No. 4, pp. 305-313.

CANADIAN TRADE SILVER FROM INDIAN GRAVES IN NORTHERN ILLINOIS

by

James W. VanStone

Field Museum of Natural History

The archaeological specimens which form the basis of this paper were excavated in the early years of the present century from Indian burial mounds in Forest Home Cemetery on the banks of the Desplaines River. Today the cemetery is in Forest Park, a western suburb of Chicago. Although details are lacking, the burial mounds were apparently leveled to fill in a swampy area of the cemetery and at least thirteen skeletons were uncovered along with a quantity of artifacts. These materials, stored for many years in the cemetery office, were eventually turned over to the Forest Park Library where I examined them in October, 1968. [1]

The collection includes a variety of laminated sheet silver trade ornaments, most of which are reasonably well preserved. Some have identifying marks that make dating within fairly narrow limits possible. Such ornaments were made for use in the fur trade by silversmiths in Canada, England, and the United States and are considered to be the best criterion for dating archaeological sites in the western Great Lakes area between 1760 and 1820 (Quimby 1966:91). Although there is a considerable literature on various aspects of Indian trade silver, relatively few collections of known provenience have been described and illustrated in detail; none at all from the northern Illinois area.

The collection to be described here was not excavated under controlled conditions and it has been impossible to obtain more data concerning provenience than the scanty information noted above. Nevertheless, these ornaments reveal interesting details about the spread of

[1] I would like to express appreciation to Mrs. Isabel B. Wasson of River Forest, Illinois for calling my attention to the silver ornaments described in this paper. Thanks are also due to Miss Josephine Austin, Librarian of the Forest Park Library, for permission to remove the artifacts to Field Museum of Natural History for study. Mr. John E. Langdon of Toronto read an early draft of this paper and offered several valuable suggestions.

trade silver into Illinois and its use by the Indians.

Because of the considerable movements of people into and out of northern Illinois during the eighteenth and early nineteenth centuries, it is difficult to determine with certainty the specific Indian tribe represented by these graves on the banks of the Desplaines River. It is known, however, that the Potawatomi began moving into northeastern Illinois from the Green Bay region early in the eighteenth century, and by 1800 there were sizeable settlements of these Indians in the Chicago area. Many of the Potawatomi villages contained numbers of Ottawa and Chippewa Indians who were closely related to the former both linguistically and culturally (Bauxar 1959:54; Blasingham 1961:166-169). It is very likely, therefore, that the occupants of the graves, those who wore the ornaments about to be described, were members of one of these tribes. The major Potawatomi withdrawal from Illinois began in 1832 and had been virtually completed four years later (Bauxar 1959:54).

The silver ornaments from graves in the Forest Home Cemetery can most conveniently be considered under five headings which correspond. for the most part, to the areas of the body where they were worn; wristbands, armbands, brooches, gorgets and earrings. All of these objects, when first examined by the author, were covered with a heavy green patination. This was caused by the copper alloy in the silver, a substance that resulted in the preservation of a number of textile fragments with which the silver had been in close contact. Prior to study, as many of the ornaments as possible were cleaned by means of a glass bead blasting technique.

WRISTBANDS are, for the most part, remarkably uniform in appearance. Out of a total of ten specimens, seven have straight edges and parallel ridges on the outer surface (Pl. 1, 4). All of these are approximately 16 cm long and 2 cm wide. They are drilled at either end for the insertion of thongs by which the bands were held and adjusted to the size of the wearer's wrist. On four specimens the thongs are still in place. A single wristband is approximately the same size as the others, but has scallop edges as well as parallel surface ridges (Pl. 1,5). Two specimens are quite distinctive and appear to have been cut from armbands. Both exhibit, along one side, the longitudinal border ridges characteristic of armbands; they are roughly cut along the other side (Pl. 1, 3). Fragments of thongs are attached to the perforations on both these specimens.

In addition to the typical wristbands with parallel ridges just described, there are two virtually identical bands that are much shorter and narrower (Pl. 1, 8). These do not seem to have been cut down from full sized wristbands. They were probably worn by small children.

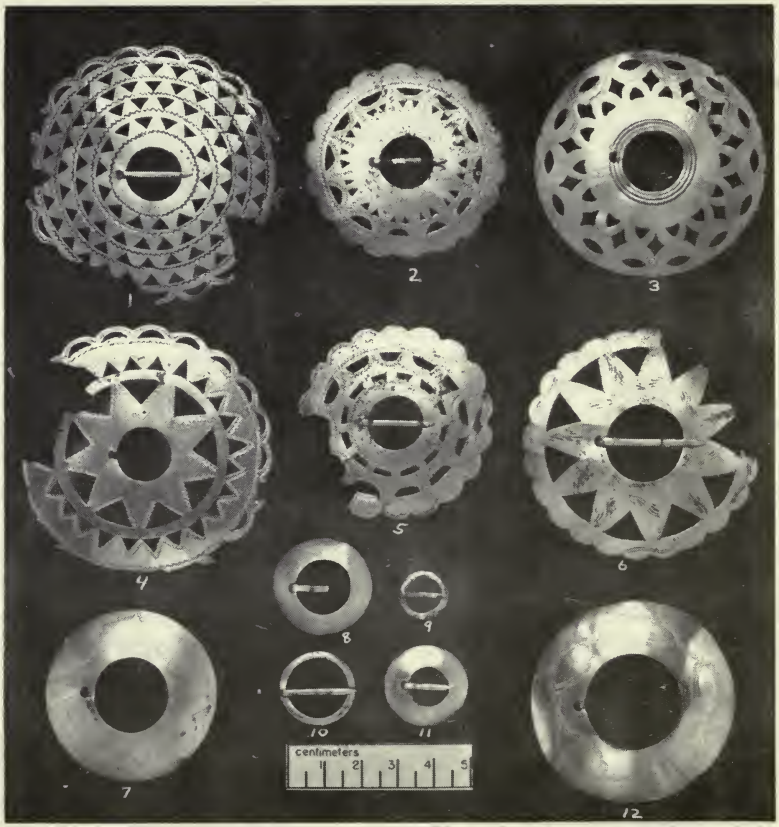
Wristbands from sites in Michigan similar to those in the Forest Home Cemetery collection are described and illustrated by Quimby (1958:317, fig. 1, 1) and Herrick (1958:11, fig. 29). Such bands were apparently worn more frequently by women than by men (Quimby 1966:92).

There are five ARMBANDS in the collection, all of which were apparently modified to some extent by their Indian owners. Four are virtually identical, being approximately 7 cm wide, bordered by longitudinal ridges, and from 12 to 14 cm in length. They are decorated with designs, engraved with a small burin or engraving tool, which reveal an interesting characteristic of the armbands. In each case the designs are at one end of the specimen and cut off, suggesting that the Indians cut the original bands in order to make a larger number of small ones. These bands, which presumably were worn just above the elbow by men (see Quimby 1966: fig. 32), originally circled the arm. But cutting the

original band in half, only the outer side of the arm would be covered (Pl. 1-2). Paired perforations at either end served for the insertion of thongs which stretched around the unexposed side of the arm. Two of these smaller armbands appear to have been made from the same full sized one since the engraved design, a long necked bird, is continuous on the two specimens. Another band also has part of a long necked bird while a fourth shows the rear half of some four footed animal.

The fifth armband in the collection is fragmentary but appears not to have been reworked in the manner of those just described. The specimen, which is approximately 25 cm long and was at least 10 cm wide, closely resembles one from Michigan illustrated by Quimby (1958: fig. 1, 2). It has longitudinal ridges along the edges and an engraved central design showing a seated human figure facing a seated animal, probably a dog. Only the lower halves of these figures are visible.

The most abundant ornaments in the Forest Home Cemetery collection are BROOCHES of which there are four types. These belong-



ing to type 1, five in number, are concavo-convex disks with central circular openings. On two specimens a hinged pin for fastening the brooch to the garment lies across the opening. These brooches, four of which are illustrated (Pl. 2, 7-8, 11-12), show a variety of sizes and simple engraved decorations. Type 1 brooches are illustrated in nearly every published collection of Indian trade silver (see Quimby 1958:fig. 1, 7; fig. 2, row 2; Alberts 1953: Pl. 3, j).

Type 2 brooches are similar in shape to those just described but tend to be larger and are much more ornate. All are ornamented with a symetrical arrangement of oval, triangular, diamond shaped and semi-lunar perforations in combination with engraved designs. To show the range in size and decoration, four specimens are illustrated (Pl. 2, 1-3, 5). Like those of type 1, the type 2 brooches have also been widely described and illustrated (see Quimby 1937: fig. 2, first row; 1958: fig. 1, 5-6; 1966: fig. 20, lower left; Alberts 1953: Pl. 3, e, Pl. r, e-f; Herrick 1958: Pl. 3, figs. 30-31).

There are two specimens belonging to type 3, the so-called "Star brooch" (Quimby 1966:93). Like the others that have been described, these brooches are concavo-convex in cross section with round openings in the center. One has a nine-pointed star design enclosed by a narrow rim and a symmetrical arrangement of triangular and semi-lunar perforations (Pl. 2, 4). The other has an eleven-pointed star enclosed by a narrow scalloped border (Pl. 2, 6). There is some engraving on both specimens. Star brooches would appear to be relatively common in collections of Indian trade silver as they are present in most of the sources mentioned above.

By far the most common brooches in the collection are those belonging to type 4. These are plain, circular rings of silver, empty in the middle except for the cross pins which fasten them to garments. Although they vary somewhat in diameter, there are two general sizes; a large variety that is approximately 2 cm in diameter (Pl. 2, 10), and a smaller one with a diameter of 1.2 cm (Pl. 2, 9). The large form occurs in greater abundance with 64 loose specimens and more than 225 attached in clusters to garment fragments. In addition there are eleven attached to braids of human hair (Pl. 3, 3). A similar use for such brooches has been reported from a burial at the Ada site, Kent County, Michigan (Herrick 1958:6). Eighty-three of the small brooches are attached to textile fragments and there are six loose specimens.

Of considerable interest are these garment fragments with clusters of type 4 brooches worn as decoration (Pl. 3, 1, 4). [2]

[2] **For assistance in identifying the garment fragments, I wish to thank Mr. Harold B. Burnham, Textile Department, Royal Ontario Museum.**

The greatest number of brooches, both of the large and small variety, are attached to seven fragments of wood block printed cotton. Materials of this type were produced in many parts of France and, to a lesser extent, in England and Scotland. At least three of these fragments appear to have been part of a one-piece, straight cut garment with separate attached collar, probably a woman's dress. An interesting feature of this dress, as shown on one large fragment, is a false shoulder seam sewn on with two-ply linen thread. This seam may have been of a different color than the rest of the garment.

A smaller number of large type 4 brooches were fastened to a fragment of napped woolen flannel, slightly fulled, of average quality. The best materials of this type were always of English manufacture with the

average and poorer qualities being either English or French. This fragment is probably part of a blanket, perhaps worn thrown over the shoulder. Brooches attached in clusters to garments frequently are shown in contemporary portraits of Indians, but they are not often found in an archaeological context.

Thirty-one small brooches are fastened to a narrow strip of leather with a tassel of worsted ribbon at one end (Pl. 3, 2). A few brooches were apparently attached to this ribbon as well. The object may have been a dangle intended for wear as decoration on some garment.

Two types of GORGETS are recognized by students of Indian trade silver and there is one specimen of each type in the Forest Home Cemetery collection. A crescent-shaped gorget is concavo-convex in cross section with suspension holes at the points of the crescent. The convex surface of this specimen is engraved with small dots in two parallel, wavy lines (Pl. 1, 9). According to Quimby (1966:92), such ornaments were an adaptation of gorgets worn by British army officers. This specimen is very simple and plain when compared to many illustrated specimens in other collections (See Woodward 1945:Fig 3; Quimby 1958: fig. 1, 3; Barbeau 1942:12, upper left hand corner, bottom).

A fragmentary round gorget is also concavo-convex in cross section (Pl. 1, 10). It has an engraving of a fox or similar animal in the center

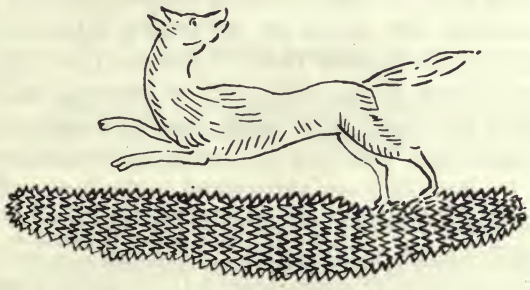


Figure 1

(fig. 1) and an engraved border on the concave side. There are two suspension holes. Quimby (1966:93) believes that the round gorget had its origin in the aboriginal shell gorget of the Indians.

There are two types of earrings in the collection. Three specimens have a double-barred cross in combination with a small cone-shaped pendent suspended on a thin piece of silver wire (Pl. 1, 7). The second type, of which there are ten specimens, is simply a cone-shaped pendant suspended from a circular piece of wire (Pl. 6). Similar earrings are illustrated by Quimby (1958: fig. 1, 10), Herrick (1958:P 1. 3, 21) and Alberts (1953: Pl. 9, e).

Silversmiths who produced ornaments for the Indian trade frequently stamped their wares with their individual mark. Thirteen specimens from Forest Home Cemetery are punch marked in this manner and all marks are those of Canadian craftsmen. Three brooches, two bracelets and one armband are stamped with the roman letters "PH" separated by a pellet and in an oblong cartouche (see Quimby 1966: fig. 21, 3). This is the punch mark of Pierre Huguet dit Latour (1749-1817), a Montreal silversmith and merchant, and his son (1771-1829). The elder Huguet sold large quantities of trade silver to North West Company traders in 1797 and 1798 (Langdon 1966:94). Two bracelets with the Huguet mark also have the word "Montreal" in a long, rectangular cartouche, while a single bracelet without maker's initials is similarly marked.

There are three armbands which have punch marks consisting of the roman letters "IS" in an oval cartouche (see Quimby 1966: fig. 21, m). This is the mark of the Quebec silversmith Joseph Schindler and, after his death, his wife. Schindler was living in Quebec City as a silversmith at least as early as 1767 and worked there until his death in 1786. The Widow Schindler, as she was called, moved to Montreal and provided Indian trade silver from 1797 until she died in 1802. According to Langdon (1966:125-126), it is not clear from the records whether she actually made silver or simply acted as an agent. Traquair (1938:5) suggests that she may have carried out her work as a kind of home industry (Alberts 1953:28; Barbeau 1940:33; Quimby 1966:199).

An important figure in the silver trade in Montreal was Narcisse Roy (1765-1814). His punch mark, which occurs on one bracelet, consists of the script letters "NR" in a trapezoidal cartouche (see Quimby 1966: fig. 21, h). Roy, who was apprenticed to the famous craftsman Robert Cruickshank, made and sold silver to the Northwest Company, Outfit 1799-1803 (Langdon 1966:121).

The Montreal silversmith Charles Arnoldi (1779-1817) is represented by a single brooch (Pl. 2, 8). His punch mark consists of the letters "CA" in script capitals separated by a pellet (see Quimby 1966: fig. 21, g), and documentary evidence dates his work from at least 1784 to 1810 (Alberts 1953:26-27; Langdon 1966:42; Quimby 1966:198) Barbeau (1942:13) illustrates a fine double-barred cross by Arnoldi which is now in the American Museum of Natural History.

The final marked specimen to be discussed here is a bracelet with the roman letters "PM" in a rectangular cartouche (see Langdon 1966: 103). This punch mark is probably that of Paul Morand (1775-1886). He was apprenticed to Pierre Huguet dit Latour in 1802.

On the basis of the information presented above, it can be said with reasonable certainty that the graves in Forest Home Cemetery date be-

tween approximately 1780 and 1820. During that period, the fur trade was becoming increasingly important to the economy of Canada and a large number of traders, including such well known names as McTavish, Fraser and McGillivray, were closely associated with the North West Company and its struggle with the Hudson's Bay Company for control of the trade. These Montreal-based traders, many of whom traded in the western Great Lakes region, tended to patronize local silversmiths to a greater extent than did those of the Hudson's Bay Company who generally ordered their supplies from England (Langdon 1966:17-20).

In spite of considerable efforts made by the Americans to secure the support of Indians in the Great Lakes area during the Revolutionary War, most of the native peoples of this region favored the British. The intensive activities of Canadian traders were at least partly responsible for this situation and English influence continued to be felt until after the War of 1812. In northern Illinois and contiguous areas the Chippewa, Ottawa and Potwatomi were all British allies. Quimby (1937:18, 20) believes that this explains the large proportion of Canadian silver ornaments found in the area. It probably also explains why the trading contacts of Indians buried in Forest Home Cemetery were primarily, if not exclusively, with Canadian traders.

BIBLIOGRAPHY

Alberts, R.C.
1953 "Trade silver and Indian silver work in the Great Lakes region." **The Wisconsin Archaeologist**, vol. 34, no. 1, pp.2-121.

Barbeau, M.
1940 "Indian trade silver." **Transactions of the Royal Society of Canada**, Section II, pp. 27-41.
1942 "Indian trade silver." **The Beaver**, Outfit 273 (December), pp. 10-14.

Bauxar, J.J.
1959 "The historic period," **Illinois Archaeological Survey**, bulletin no. 1, pp. 40-58.

Blasingham, E.J.
1961 "Indians of the Chicago area ca. 1650-1816." **Illinois Archaeological Survey**, bulletin no. 3, pp. 163-173.

Herrick, R.
1958 "A report on the Ada site, Kent County, Michigan." **Michigan Archaeologist**, vol. 4, no. 1, pp. 1-27.

Langdon, J.E.
1966 **Canadian Silversmiths 1700—1900.** Toronto.

Quimby, G.I.
1937 "Notes on Indian trade silver ornaments in Michigan." **Papers of the Michigan Academy of Science, Arts, and Let-**

ters, vol. 22, pp. 15-24.

1958 "Silver ornaments and the Indians." **Miscellanea Paul Rivet, Octogenario Dicata (XXXI Congreso Internacional de Am--ericanistas)**, pp. 318-337.

1966 **Indian culture and European trade goods.** University of Wisconsin Press.

Traquair, R.

1938 "Montreal and the Indian trade silver." **Canadian Historical Review**, March, pp. 1-8.

Woodward, A.

1945 "Highlights on Indian trade silver." **Antiques Magazine**, June, pp. 328-331.

THE THEORY OF THE BIRDSTONE AS AN ATLATL HANDLE GRIP, REVISITED

By Robert Ritzenthaler

On a visit to the Mujica Museum of Gold near Lima, Peru, I noted with some excitement a collection of Nazca spear-throwers. Due to the desert conditions of coastal Peru, they had survived for nearly 2000 years completely intact as to wooden shaft, wooden hook lashed to the rear, and bone or wooden handle-grip lashed to the front (Fig. 1). The striking aspect was that the shape of some of the handle-grips were remarkably similar to the stone birdstones found in late Archaic times in the Great Lakes Area of the United States, and to which no agreed upon function has been forthcoming. Usually catalogued by museums or described in the literature as "ceremonial objects" or "problematicals," their real function has hung in limbo. The purpose of this article is to present my conviction that the birdstone was used by our prehistoric Indians as an atlatl hand grip or brace.

I photographed the Mujica specimens and upon my return to the Milwaukee Public Museum made a reconstruction. This consisted of a one inch dowel 30 inches in length with one flat, planed surface. To this surface, starting one inch from the front, a series of four vertical holes were drilled positioned so that they could accommodate cords passing through the front and rear holes found at the base of a birdstone specimen selected from the museum collections. The birdstone was bound on with the head facing the distal end of the shaft (Fig. 2). Additional lashings were passed around the shaft and over the back of the birdstone, giving further firmness to the attachment and follow-

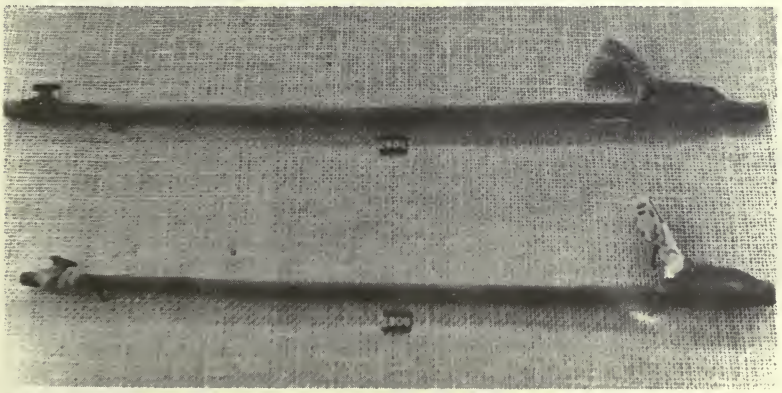


Fig. 1. Nazca Atlatls, Mujica Museum, Lima, Peru.

Fig. 2. Atlatl Reconstruction with Wisconsin Birdstone.

ing the Peruvian model.

As the reconstruction was to be used for testing purposes, a hook was required to stay the end of the spear. This posed somewhat of a problem as atlatl hooks have not been reported for the Midwest, although the Kentucky type could have served as a model. About this time, however, a curiously modified bear canine was discovered in a cave near Platteville, Wisconsin, containing Archaic (and other) material (Fig. 3). No atlatl hooks of this shape or material have been recorded, but a wooden replica was made and set into the distal end of the shaft to test its practicality as a hook, as an additional phase of the experiment. While it worked well in the test throwing of a spear, its original function as an atlatl hook is, at this stage of our knowledge, only hypothetical. The functioning of the birdstone as a grip, however, was completely convincing in the tests. Besides being a convenient and practical grip, it serves to steady the spear shaft before and during the release. It can be gripped with the last three fingers over the back of the birdstone and index finger and thumb holding spear. It also works well with the last three fingers braced against the base of the birdstone. (Fig. 4).

In checking the literature, I had first sought out Kellar's monograph, "The Atlatl in North America," the only comprehensive study thus far

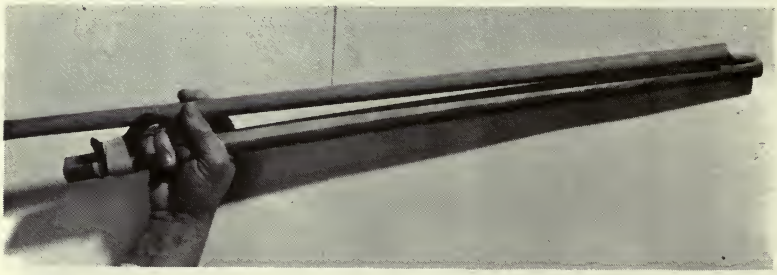


Fig. 4. Test throwing was done either with three fingers over back of birdstone or braced against birdstone as shown here.

done. While Kellar (p. 313 and 317) cites references to Kentucky and Indiana atlatl hooks found with drilled antler sections indicative of altatl handles, he does not deal with the problem of birdstones as handles. Turning to Townsend's "Birdstones of the North American Indian," I was in for a surprise: a chapter titled "The Atlatl Handle Grip Theory" picturing the Peruvian atlatls, describing his experiments with birdstones as handle grips, with the cautious conclusion that it may be the solution as to the use of at least some of the birdstone types. His experiments in throwing spears with reconstructed atlatls using birdstones as grips satisfied him as to their usability including some of the more unique types as the popeyed and bust. He noted that the wear in the birdstone perforations was always at the center, never at the sides, which one would expect from bindings subjected to a forward-backward stress which would occur in atlatl use. Townsend (p. 169) also pictures two cut bear teeth found with a birdstone in a red ocher burial in Emmet County, Michigan, with the speculation that they may have served as atlatl hooks. Each is different in shape and neither is the shape of the Platteville specimen, although all three are of such form to be functional as hooks.

There are other factors favoring the theory of the birdstone as atlatl grip. The occurrence of the birdstone in Early Woodland, and especially, Archaic horizons, are horizons that have provided the bulk of evidence for the presence of the atlatl, particularly in the form of atlatl hooks such as were found at Indian Knoll and other Kentucky Archaic sites. Then too, the relatively large percentage of birdstones broken at the neck or with broken perforations suggest that they were subjected to some form of hard usage such as would occur in atlatl use. The breakage factor certainly argues against the old theory of ceremonial use. The argument that broken specimens may have been "killed" is ruled out by the presence of repaired specimens and the unlikelihood of killing have taken place on the perforations. The Peruvian analogy: the fact that similar objects definitely served as handle grips, albeit in a distant part of the New World, would appear to offer the strongest support for a similar use of the birdstone.

In six months of confronting local and visiting colleagues with this theory, I found that it was as new to them as it had been to me. I view my role here not as a discoverer, but as a reviver and perhaps as a reinforcer of what seems to me to be the most logical theory accounting for the function of the birdstone.

The archaeological confirmation of this theory borders on the impossible. It is unlikely that an intact Great Lakes atlatl (preserved by water?) will ever be found. About the best that can be hoped for is that careful excavation of a Glacial Kame or Red Ocher burial site will

reveal a birdstone lined up with a hook in original atlatl spacing and position.

BIBLIOGRAPHY

Kellar, James H. The Atlatl in North America. Indiana Historical Society, Prehistory Research Series, Vol. III, No. 3, June, 1955.

Moore, C.B. Some Aboriginal Sites on Green River, Kentucky. In Jr. of the Academy of Natural Sciences of Philadelphia, 2nd Series, XVI (1916), 440-87.

Townsend, Earl C. Birdstones of the North American Indian. Privately printed, Indianapolis, Indiana, 1959.

Uhle, Max. Peruvian Throwing–Sticks. American Anthropologist N.S. Vol. II, No. 4, p. 624-627.

CLOVIS AND SANDIA–LIKE POINTS FROM DANE COUNTY, WISCONSIN

By Robert Ritzenthaler

Mr. Theodore Kouba reports the finding of four single-shouldered points occuring as surface finds on the Kouba Site (Fig. 1). The basal edges are ground. One has a concave base and is fluted reminiscent of the Sandia type found at the Lucy Site, New Mexico. The other three are somewhat similar to the Sandia II type. While these are out of the range of the true Sandia points of the Southwest, the similarity is worth noting. It is of some interest also that they were found on a site which has produced a number of other surface finds of Paleo-Indian artifacts such as Clovis points and nearly 400 gravers.

The site has also recently produced two unusually long Clovis points (Fig. 2). They measure 5 5/8ths and 6 inches in length and are characterized by flaring basal edges and extremely long fluting on both surfaces. They were found within three feet of one another.

Fig. 1. Sandia–Like Points.

Fig. 2. Clovis Points.

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THE WISCONSIN ARCHEOLOGIST

THE BELOIT MOUND GROUPS: FIFTY YEARS LATER 37
by Frederick W. Lange and Mark W. Kristensen

PIONEER ARCHEOLOGY IN AN ILLINOIS MIDDLE WOODLAND MOUND *by Stuart Stuever* 49

EVIDENCE SUPPORTING THE THEORY OF CLIMATIC CHANGE AND THE DECLINE OF HOPEWELL *by D. Vickery* 57

ANOTHER RADIOCARBON DATE FOR THE OCONTO SITE *by Robert Ritzenthaler* 77

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THE BELOIT MOUND GROUPS: FIFTY YEARS LATER

Frederick W. Lange
University of Wisconsin-Madison

Mark W. Kristensen
Beloit College

A resurvey of the Beloit-Rock River series of mound groups described by Ira M. Buell (1919) was made to select possible sites for excavation and to determine the loss of mounds in the Beloit area in the past fifty years. Buell's work built on previous surveys by the Rev. Stephen Peet (1898) and by Robert Becker (1913) and ended with the following comments:

> The permanent preservation of some of the distinctive mound groups in this region is much to be desired and should be undertaken by the cities of Beloit or Rockford or by the counties or townships in which they are located. The rate at which these ancient monuments have been disappearing makes this now imperative (p. 149).

The recent survey allows description of the present condition of the Beloit-Rock River and Turtle Creek mound series, with a corresponding inference to the impact of Buell's admonition. The previously unreported excavation of one mound, the Yost mound, is also presented.

THE BELOIT–ROCK RIVER SERIES: Township 1 N Range 12 East Beloit Township, Rock County, Wisconsin.

The Beloit College Group (Ro-15) NW¼ of SW¼ of Section 36

The original map of this group, published in Lapham's "Antiquities of Wisconsin" in 1855, shows 14 conical mounds and 5 linears. Buell notes the destruction of one linear and the addition of a previously unmapped turtle and linear mound. The most recent report on the Beloit College group was by Bastian (1958). His map (see Figure 2) shows a total of 27 mounds: 6 linear, 13 conical, 6 oval, and 2 turtle effigies. Of these, 1 turtle, 1 linear, and 2 conical mounds have been destroyed. Two conicals, 2 ovals, and 1 linear have been excavated and are discussed in Bastian's report. Mounds in the immediate vicinity of the campus have been added to the group through acquisition of properties by the College. Recent building by the College has not damaged remaining mounds, nor have commercial excavations revealed additional indications of prehistoric activities, such as habitation areas.

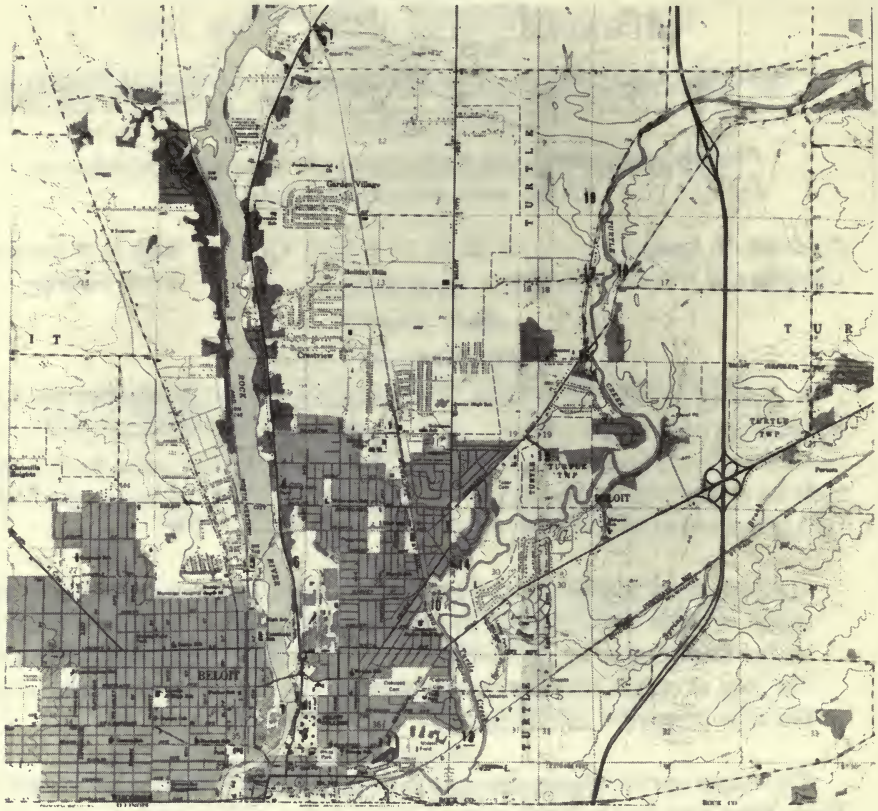


Figure 1. Map of Beloit area, showing mound groups surveyed: 1) Roth Group; 2) Yost Mound; 3) Weirick Group; 4) Henderson Mound; 5) Poe Mound; 6) Adams Group; 7) Water Tower Group; 8) Beloit College Group; 9) Baldwin Group; 10) Joint Switch Group; 11) Stone Mill Group; 12) State Line Group; 13) Hillcrest Group; 14) Strong Group; 15) McLenegan Group; 16) Murphy Group; 17) Lathers Group; 18) Pierce Group; 19) Baarz Group.

Water Tower Group (Ro-19) NE¼ of NE¼ of Section 35

The presence of this group was reported by Rev. Peet. By Buell's time the mounds were only vague outlines and could no longer be associated with definite shapes. Even these vague outlines are no longer visible; the only suggestion of a mound is a small rise between two oak trees on the crest of the hill.

Adams Group (Ro-33) SE¼ of NE¼ of Section 26

The mound group is located at an area known as Pageant Park, on the north end of a tract belonging to Fairbanks, Morse Co. The original group consisted of 13 members: 3 turtle mounds surrounded by 4 conicals and 6 oval and linear

mounds. Bull-dozing and reworking of the terrace have eliminated traces of most of these. One turtle and one oval mound are still recognizable (Figure 3).

Poe Mound (Ro-34) SW¼ of NE¼ of Section 26

Directly across the Rock River from the Adams group was a small conical mound less than twenty feet in diameter and about one and one-half feet high, from

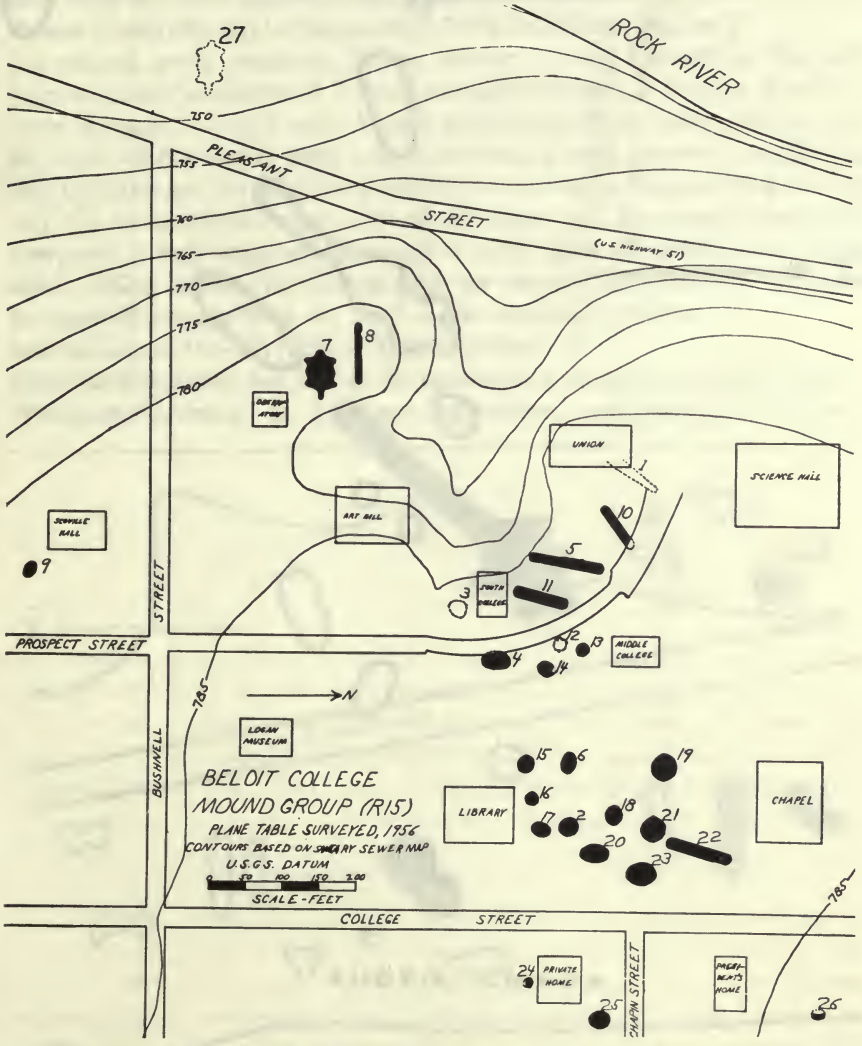


Figure 2. Map of Beloit College Group (from Bastian, 1958). Dotted lines ind cate mounds which have been destroyed. Mounds 2, 3, 4, 5 and 6 have been e cavated.

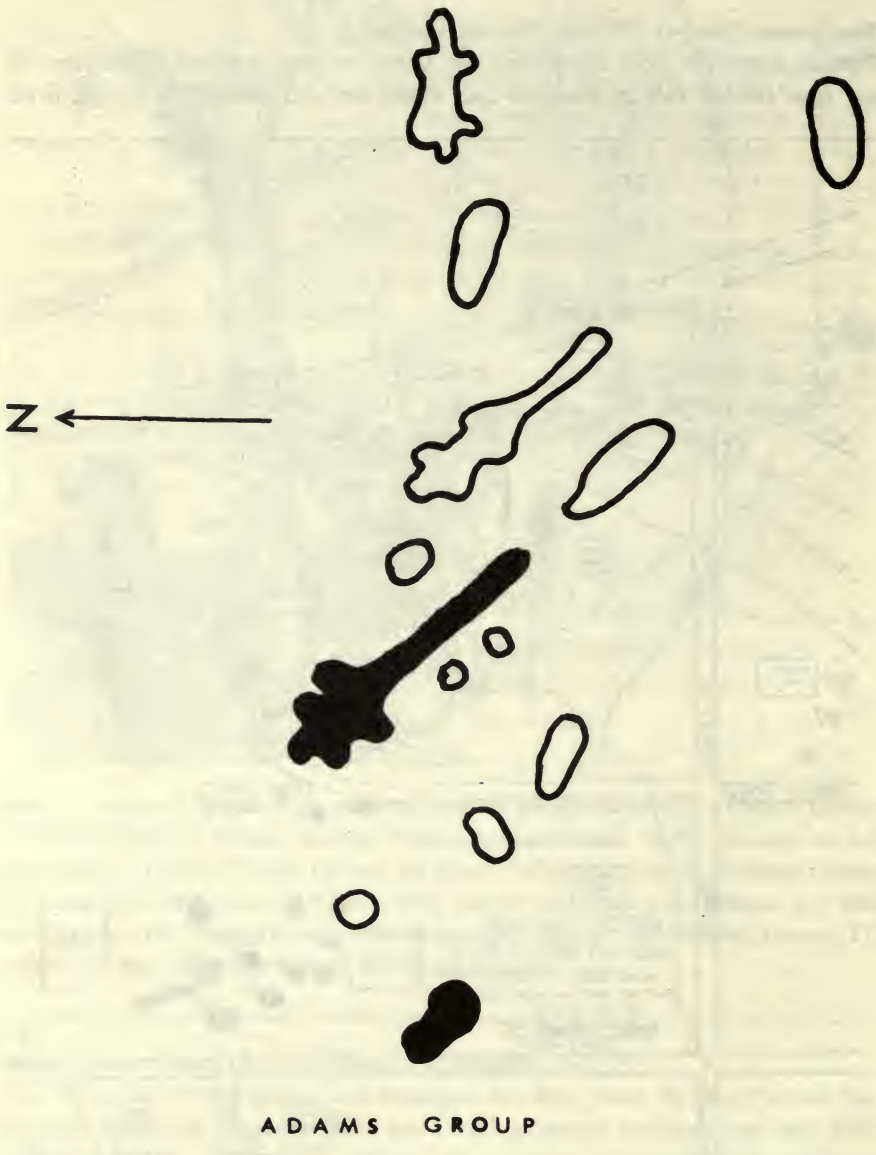


Figure 3. Adams Mound Group. Blackened mounds survive.

which seven burials were removed during the 19th century. This mound had already been obliterated by the time of Buell's survey.

Henderson Effigy (Ro-27) SE¼ of SE¼ of Section 23

Half a mile north of the Adams group, on the edge of the terrace, is a solitary effigy mound. The mound appears to be of the turtle variety and Buell described it as being the central figure in the Rock River series. This mound is extant, being located in the front yard of a private residence.

Weirick Group (Ro-30) On line between NE¼ and SE¼ of Section 23

The original group consisted of three clusters totaling 15 mounds. The northernmost cluster consisted of 1 dumbell-shaped mound, 2 bearlike mounds, 2 linear mounds, 1 conical mound and 1 incomplete effigy figure, possibly a turtle. South of this cluster were 3 linear mounds, 2 being oriented in parallel east-west positions and the third lying slightly to the south and approaching the other two at a north-eastward angle. East of this cluster, on the second terrace of the river, were 2 turtle mounds, 1 incomplete turtle figure (dumbell), 1 oval mound, and 1 conical mound. Two linears from the second cluster and the conical and the dumbell mounds from the third cluster remain (Figure 4).

Baldwin Group (Ro-28) NE¼ of SE¼ of Section 14

While Buell reported that one of the three conical mounds mapped by Wilson in "Prehistoric America" (p. 146) was still visible, examination of this area in

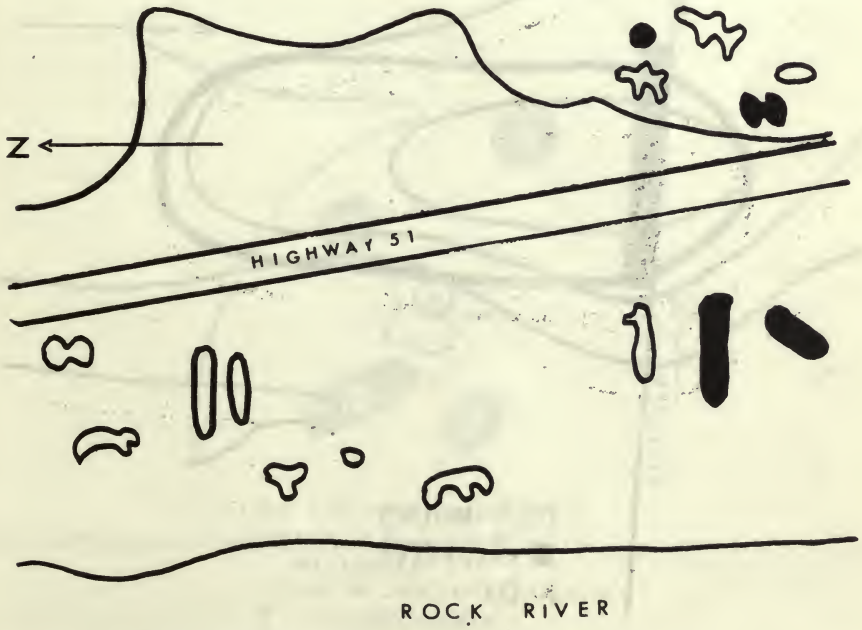


Figure 4. Weirick Group. Blackened mounds survive.

1968 yielded negative results.

Roth Group (Ro-21) SW¼ of SW¼ of Section 1

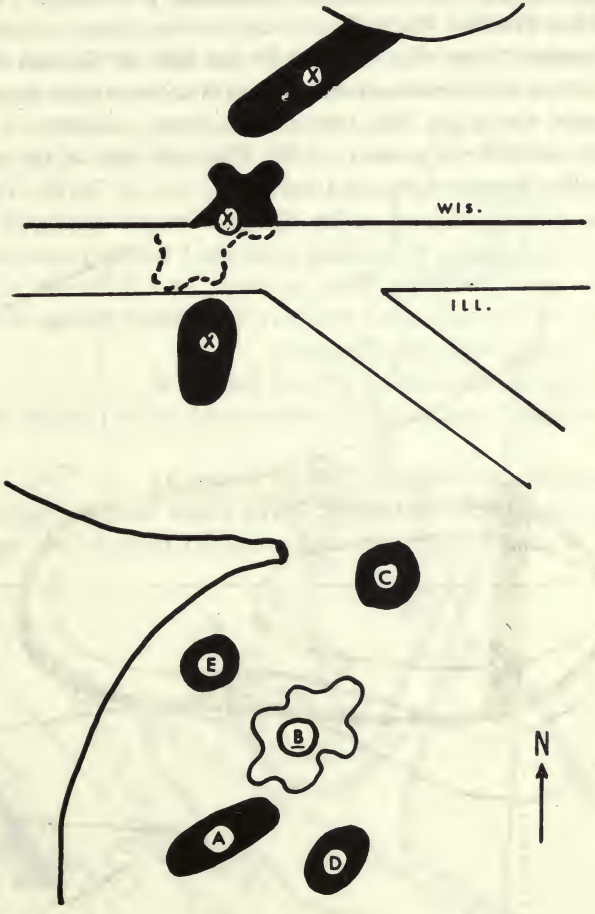
This group was located by Charles Hydè of Beloit College Class of 1914. Two distinct oval mounds and faint traces of others were located along the terrace of the Rock River where it changes its course from north-south to east-west and widens into a broader vallet just north of the township line. No mounds were visible when this area was re-examined.

Yost Mound (Ro-23) NW¼ of NE¼ of Section 14

This mound was reported by Buell as being a solitary linear mound 80 feet long and 16 feet wide (1919:126). It lies atop and near the western edge of a relatively low bluff, approximately one mile north of the Baldwin group and one-eighth of a mile east of the Rock River. Allen Wells, a student at Beloit College, excavated this mound in the fall of 1963. The following summary is presented from his unpublished notes on the excavation:

Figure 5. The Yost Mound.

Wells described the mound as being 22 feet wide and 69 feet long. The discrepancy in distances between this and Buell's observation is apparently due to gravel borrowing from the edge of the bluff with subsequent erosion on the south and west sides of the mound. No other disturbance was noted in the mound. The orientation of the mound is along a north-south line. A 27-foot by 3-foot trench was excavated in 3-foot square units across the north end of the mound. Excavation revealed that the original humus line has been removed prior



STATE LINE MOUND GROUP (Ro-39)
(AFTER BUELL, 1919)
X DESTROYED
A-C-D-E EXCAVATED, 1963
B UNEXCAVATED

Figure 6. The State Line Mound Group.

to construction of the mound and that the mound was constructed directly on the outwash gravels. The mound fill consisted of a sandy soil interspersed with rock fragments and pebbles.

Excavation produced three artifacts: two bone fragments, both broken and poorly preserved which Wells tentatively identified as human; and one chert projectile point, the base of which was missing.

The Yost Mound is illustrated in Figure 5.

TURTLE CREEK MOUND GROUPS: Township 1 N Range 12 East, Beloit Township, Rock County, Wisconsin.

State Line Mound Group (Ro-39) SE¼ of the SE¼ of Section 36

This group at one time traversed the Illinois-Wisconsin state line. The original group contained 8 mounds. The two northern-most members of the group, a linear mound and a turtle mound, on the Wisconsin side of the line, were destroyed by undermining of the second outwash terrace by Turtle Creek. The third northern-most mound, an oval on the Illinois side, was destroyed by road construction. The 5 remaining Illinois-side mounds, 1 turtle, 2 conicals, and 2 ovals were found in good condition. These mounds, except for the effigy, were excavated by the authors and other students from Beloit College during the summer of 1967 (Lange 1968). (See Figure 6).

Stone Mill Group (Ro-38) NE¼ of SW¼ of Section 36

This group originally consisted of 2 turtle mounds and 4 conicals, of which none remain.

Hillcrest Group (Ro-147) NW¼ of SW¼ of Section 31

This group lies across the bottoms of Turtle Creek from the State Line Group. At the time of Buell's survey, it consisted of six mounds: one tapering linear,

Figure 7. The Hillcrest Mound Group. Blackened mounds survive.

two turtle effigies, and three conicals. The linear and one turtle were located on the east side of the railroad tracks; the former and the eastern half of the linear remain. The three conicals and one turtle to the west of the tracks have been destroyed. (See Figure 7).

Joint Switch Group (Ro-142) NE¼ of SE¼ of Section 25

This was the largest known group in the Beloit area. As originally surveyed by the Rev. Peet, there were 39 mounds—none remain. Five of these were panther effigies, two were effigies of an undetermined nature, four were linear mounds, with the rest being conical and oval tumuli. Resurvey of the area indicated that the mounds in the southern portion of the group (those lying close to the first

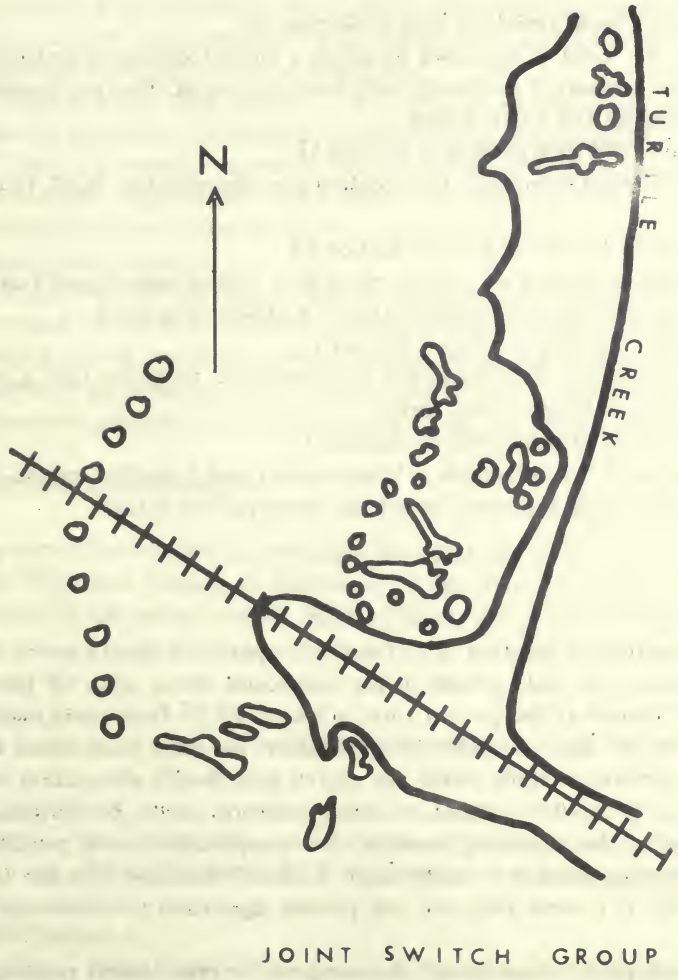


Figure 8. The Joint Switch Group. Completely destroyed.

terrace of Turtle Creek and south of the present gravel-mining operations) were destroyed by the installation of a large subterranean concrete structure. The northern portion of the group, farther back on the terrace, was in the area which has been excavated for commercial purposes by the gravel company. An arc of 9 conicals to the west was destroyed by residential development (See Figure 8).

TURTLE TOWNSHIP (T 1 N R13E Rock County, Wisconsin)

Strong Mound Group (Ro-143) NE¼ of SW¼ of Section 30

A group of four mounds consisting of 2 ovals, 1 conical, and 1 turtle effigy was reported by Buell. The first three were partially destroyed by the construction of Arrowhead Drive; the eastern edges are vaguely visible. The effigy mound has been completely destroyed by suburban development.

McLenegan Group (Ro-141) NW¼ of SE¼ of Section 19

One large mound 45' x 60' is described by Buell; a mound known to be to the east of this oval was reported to already have been destroyed. The large mound survives in the frontyard of a farm house.

Murphy Group (Ro-140) SE¼ of SE¼ of Section 18

A group of seven conical mounds in this location were described by Buell. None remain.

Lathers Group (Ro-139) NE¼ of SW¼ of Section 18

This group originally consisted of 2 linear mounds, 1 conical mound, and 1 oval mound. Examination of the area indicated that all had been destroyed.

Baarz Mounds (Ro-136) NE¼ of SE¼ of Section 7

Buell described this group as containing 3 linear mounds, forty-five feet, sixty feet, and ninety feet in length. None survive.

Pierce Group (Ro-138) SE¼ of NW¼ of Section 17

This group consisted of 3 oval mounds, 1 linear mound, and 1 panther mound. A housing development along the creek terrace has destroyed any traces.

SUMMARY:

This survey covered the location of 127 mounds reported in Buell's survey of 1919 and represents the main groups in the immediate Beloit area. Of these 127 mounds, 41 remain at the present time, a loss of 67.7% from these major groups. Except for the Beloit College group, no effort has been made either to document or to preserve mounds within the city or area. Buell's admonition for the preservation of prehistoric remains, evidently unheard, should be re-emphasized. In addition to the remaining mounds, this is especially true of possible village/habitation areas which are equally liable to destruction and even less visible on the surface. It is these sites that will provide significant non-ceremonial information.

What conditions permit these losses? Are academic or civic leaders responsible for the conservation of these prehistoric resources as a part of the public

trust they have assumed? As they are often involved with the forces of expansion and development that so often bring about the unstudied destruction of prehistoric remains, academic and civic agencies should become more practised in their latent role as custodians of this irreplacable scientific wealth that is rapidly diminishing. As Fred Wendorf wrote:

> Conservative forecasts of future population and land use indicate that we may expect the population to increase at the rate of 18 to 20% per DECADE. But, even more significantly for archaeology, that portion of the population living in the urban areas is expected to grow from the 70% of today to 85% by 1980. The result will be an expansion of the urban areas laterally, so that—within the next 20 years the cities will sprawl over the remaining nonurban sectors of the valleys and the foothills, the only areas suitable for either modern or aboriginal habitation and the major areas where our remaining archaeological resources occur (1963:288).

While it is true that Wendorf is referring specifically to the American Southwest, the same basic problems and needs are applicable to other areas.

There is a need for academic institutions to show an increased awareness of the vestiges of prehistory within their individual regions of influence, and to combine with local, state and federal resources to preserve the material evidences of prehistoric America.

Aside from the salvaging of data from threatened locations, there is an important need for the maintenance and conservation of archaeological resources. This pressing current problem is perhaps even more critical for coming generations, so that there are sites for them to explore with as yet undeveloped techniques of excavation and analysis which this scientific age can provide for archaeologists.

ACKNOWLEDGEMENTS:

The authors would like to recognize the assistance of Dr. Joan Freeman of the State Historical Society of Wisconsin; of Mr. David A. Trapp, who assisted in portions of the survey; and Mr. Richard Rhey, who prepared Figure 7.

BIBLIOGRAPHY

Bastian, Tyler

1958 The Beloit Mound Group (Ro-15), A Preliminary Report. WISCONSIN ARCHEOLOGIST, Vol. 39, No. 3, pp. 155-171. Milwaukee

Becker, Robert H.

1913 Turtle Creek Mounds and Village Sites. WISCONSIN ARCHEOLOGIST. Old Series, Vol. 12, pp. 7-20, Milwaukee.

Buell, Ira M.
1919 Beloit Mound Groups. WISCONSIN ARCHEOLOGIST. Old Series, Vol. 18, No. 4, pp. 119-151. Milwaukee.

Lange, Frederick W.
1968 The Excavation of the State Line-Mound Group (Ro-39), Beloit, Wisconsin. WISCONSIN ARCHEOLOGIST. Vol. 49, No. 3, pp. 109-125. Milwaukee.

Peet, Stephen B., Rev.
1898 PREHISTORIC AMERICA, VOLUME II. Chicago: American Antiquarian.

Wells, Allen
1963 Unpublished notes on Yost Mound excavation. In files of Logan Museum of Anthropology, Beloit College.

Wendorf, Fred
1963 Archaeology and Private Enterprise: A Need for Action? AMERICAN ANTIQUITY. Vol. 28, No. 3, pp. 286-288. Salt Lake City.

Wilson, James Jr.
1898 Map published in Stephen Peet's PREHISTORIC AMERICA, VOLUME II.

PIONEER ARCHEOLOGY IN AN ILLINOIS MIDDLE WOODLAND MOUND

By Stuart Struever
Dept. of Anthropology
Northwestern University

William McAdams was a pioneer archeologist who lived and excavated most of his life in the area near the confluence of the Illinois and Mississippi rivers, a few miles north of St. Louis. McAdams was an intrepid archeologist who, like others of his time, was fascinated with the problem of understanding the origins of the people and culture responsible for the vast number of earth mounds strung along the major river valleys south of the Great Lakes. His book, RECORDS OF ANCIENT RACES IN THE MISSISSIPPI VALLEY (1887), along with others of his publications, including "The Ancient Mounds of Illinois" and "Antiquities of Cahokia," were explorations of this problem. For almost 40 years, beginning prior to the Civil War, McAdams excavated innumerable mounds and habitation sites—perhaps more than we will ever know—in the lower Illinois and adjacent Mississippi Valleys near St. Louis in an attempt to throw some light on ". . .The Prehistoric Races of America, With Some Suggestions As To Their Origin" (McAdams, 1887:i).

Between 1881 and 1890, the Bureau of Ethnology of the Smithsonian Institution conducted a "Mound Survey" throughout the eastern woodlands of the U.S. This Survey was directed by Cyrus Thomas who later published a summary of this work (Thomas, 1894). William McAdams was employed in the fall of 1882 as one of Thomas' archeological assistants and for a time carried on mound explorations in the St. Louis area under Bureau of Ethnology sponsorship. However, both prior to and after his affiliation with the Bureau's "Mound Survey." McAdams carried out independent excavations, largely in mounds located in the Illinois and Mississippi Valleys in the area near the confluence of the two rivers.

This paper deals with one of these investigations.

McAdams established close ties with Major. J.W. Powell, Director of the Bureau of Ethnology, to whom he wrote regularly about his discoveries. Some of the McAdams-Powell correspondence is currently housed in the U.S. National Museum.[1] In one of the unpublished letters to Major Powell, dated January 14, 1881, McAdams describes the results of a specific mound excavation:

[1] **The writer is indebted to Mrs. Margaret Blaker, Archivist of the Department of Anthropology of the U.S. National Museum, for "excavating" this and other McAdams letters from the Museum Archives.**

Otterville, Ills.
Jan. 14th, 1881

My Dear Major

I have just come in from a digging expedition, had to heave the dirt up a little lively with the thermometer 10 and 15 below zero.

Explored two good mounds the contents of which may interest you.

The first is situated in the bottom, on the bank of the Illinois river, in Calhoun Co. Ills. It is oval in shape, truncated, and 175 feet in length on top, and 50 feet wide on top, sloping [plan view sketch of mound showing mound dimensions and location of the excavation] gradually to the level below.

Commencing in the centre we carried an excavation down and at the depth of 16 feet came to a shallow basin of clay, made hard, perhaps by fire. This basin was filled with white sand, covered up in the sand was, perhaps a waggon load of raw material for implements, flint, quartz, jasper, chalcedony, and all choice pieces, some of which were blocked out in the shape of the implement or ornament intended. The flint is very peculiar, being a dark brown and all broken from large nodules, three of which, weighing from 20 to 40 lbs, we found entire. These nodules are white outside and dark brown within, resembling the chalk nodules.

Laying on the sand were three large sea shell vessels, of the capacity to hold one to two quarts.

[Sketches of two sea shells and a burial pit containing 3 skeletons]

In a sitting posture on the sand, at the north end of the basin were two skeletons, and old man, from the teeth and the obliterated sutures of the [?] and a young woman with beautiful even teeth and delicate bones. About the neck of the old man was a string of peculiar beads, made of shell. Some of these were round [sketch of round bead], others cylindrical, [sketch of three cylindrical beads], but a majority of them were cylindroids with the perforations in the ends coming out laterally. [sketch of 3 cylindrical beads showing perforation holes] On the breast of the old man was a plate of copper, circular in shape and some 4 inches across [sketch of circular object with hole drilled in center] and with it another curious copper implement or ornament like a short spool, being two disks two inches across connected by a short tack in the centre. [sketch of bicymbal ear spool] These were much corroded. At the left-hand of the man was a very beautiful pipe of mottled catlinite, polished and smooth as glass, one end of the flat, curved base being perforated to form a stem. It is a splendid specimen of aboriginal workmanship without a scratch or mar upon it. [side view sketch of Hopewell plain platform pipe].

The woman had no ornaments about her, nor was anything of this nature found with a skeleton at the south end of the basin. Ashes were found about the edges of the basin, showing that fire had been used in the burial ceremony. Further exploration in the mound may reveal something more, but I am in-

clined to believe that at the burial of this old mound-builder at least two of his subjects were buried with him. . .

Wm. McAdams Jr [signed]
Otterville, Ills.

The above portion of this remarkable letter from McAdams to Major Powell is actually a valuable descriptive report of a mound excavation; a somewhat revised and shortened account of this same excavation was published in the Smithsonian Institution ANNUAL REPORT OF 1882. (McAdams, 1884:684). As noted by the bracketed phrases above, McAdams' letter is liberally sprinkled with skillfully rendered ink sketches of artifacts. Figures 1 and 2 present a few of these sketches. They leave no doubt that McAdams' 1881 excavation reached a central burial feature in a Hopewell Mound. Depicted in the letter are two of at least three marine shell (BUSYCON sp?) containers (Fig. 1), one circular copper breast plate, one copper bicymbal ear spool and one plain platform pipe (Fig. 2), all from the central burial feature. In addition, McAdams describes "a waggon load" of artifact preforms and perhaps cores of "flint, quartz, jasper, chalcedony." His description of some of the flint nodules in this cache strongly suggests they are examples of the blue-grey "hornstone" which weathers out of Menard limestones in Union County in southwestern Illinois and elsewhere (Fowke, 1928:530-532). This is the same flint referred to as "Dongola" by

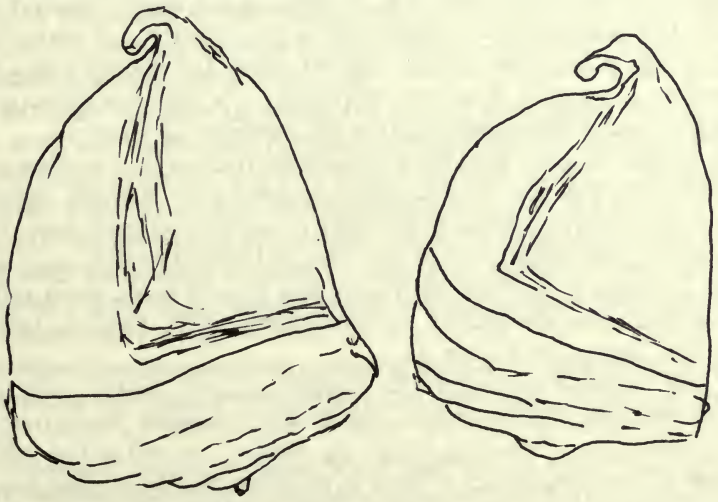


Figure 1. Marine shell containers from Merrigan Mound as sketched by William McAdams in unpublished letter to Major J.W. Powell, January 14, 1881.

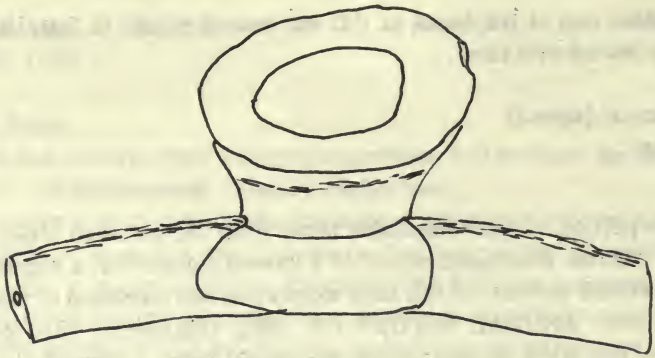


Figure 2. Plain platform pipe from Merrigan Mound as sketched by William McAdams in unpublished letter to Major J.W. Powell, January 14, 1881.

Winters (1967:54).

The "catlinite," or more likely Ohio pipestone, pipe depicted in McAdams' letter and shown in Figure 2 is the characteristic "smokestack variety" plain platform pipe that is diagnostically Hopewell and found in large numbers at the Tremper (Mills, 1916) and Mound City (Mills, 1922) sites in south-central Ohio. Struever and Houart (n.d.) briefly define this Hopewell pipe style and discuss its distribution.

Both the copper bicymbal ear spool and plain platform pipe are Middle Woodland horizon markers in the eastern U.S., establishing this Illinois Valley mound as Hopewell. This interpretation is supported by the occurrence of marine shell containers in association with the pipe and ear spool. The discovery of a large cache of preforms and cores of quartz, "hornstone" (?), and other exotic stones in a prepared pit with a white sand matrix is also suggestive of Hopewell.

In 1950–almost 70 years after the McAdams excavations–two amateur archeologists, Walter Wadlow and Gray LaDassor, excavated the Merrigan Mound in the lower Illinois Valley floodplain. Merrigan is located 300 yards west of the Illinois River and four miles south of the town of Hardin (Wadlow and LaDassor, 1951). This mound, and perhaps others now plowed down, along with an adjacent habitation site are located 35 miles north of St. Louis in Calhoun County, Hardin Township, Section 14.

Wadlow and LaDassor recovered 630 "roughly chipped blanks," over 1,000 "chunks" of hornstone and novaculite, one broken ornament "made from the jawbone of some animal belonging to the cat family," as well as four pins or skewers made of the long bones of what is probably the white-tailed deer, all from a central feature at the base of the mound. In addition to these materials, possible Hopewell diagnostics included:

a) a prepared sand floor; b) a centrally located sub-floor burial pit; c) three

superimposed mounds over this burial pit; and d) a layer of limestone slabs covering the primary mound.

Wadlow and LaDassor (1951) encountered quantities of habitation debris in the fill of the Merrigan Mound. They point out that the decoration and tempering of the Merrigan sherds are closely similar to sherds from Snyders (Griffin n.d.) and Sconce-Schudel, two well-known Havana-Hopewell habitation sites in the area.

In July, 1960, the writer collected 66 Havana and two Hopewell series sherds from the surface of the Merrigan Mound and from areas immediately to the east and north of the mound. Nine of these sherds were classifiable as either Naples Straight Dentate Stamped or Havana Zoned Straight Dentate Stamped, while one was Naples Ovoid Stamped (cf. Griffin, 1952). This and other surveys indicate a definite Havana-Hopewell habitation site bordering the east and north sides of the Merrigan Mound, while similar debris littering the mound surface suggests that the moundfill itself contains Havana-Hopewell occupational debris. Careful study of the descriptions of both the McAdams and Wadlow-LaDassor excavations strongly suggests that both pertain to the Merrigan Mound.

The following evidence supports this interpretation:

1) William McAdams' 1881 letter to Major J.W. Powell indicates the mound was oval in plan view and flat-topped (a plan view sketch of the mound is included in the letter). This is essentially the shape of the Merrigan Mound as illustrated by Wadlow and LaDassor (1951).

2) McAdams describes the mound as 175 feet long and 50 feet wide; Wadlow and LaDassor indicate that Merrigan is 175 feet long by 75 feet wide. The additional 25 foot width of the Merrigan Mound may be accounted for by spreading of the mound soils through repeated plowing across the lateral axis of the earthwork during the past half century.

3) McAdams describes tunnelling the mound, beginning in the approximate center of its top. Wadlow and LaDassor discovered that the Merrigan Mound had been previously tunnelled, and thus tunnel began in the top of the mound near the center. They also point out that shoring timbers used by the earlier explorers had almost completely decayed, indicating that considerable time had elapsed since the original tunnelling. In these shoring timbers they found "old wrought iron nails," again suggesting that this tunnel dates to at least the 19th or very early 20th century.

4) McAdams indicates that the central burial feature was located at a depth of 16 feet below the mound surface. Wadlow and LaDassor give this distance as 15 feet.

5) McAdams recovered a copper breast plate and a copper earspool in burial context. Wadlow and LaDassor recovered copper stained bones, but no copper artifacts.

6) McAdams discusses finding a "waggon load" of chert and chalcedony nodules, cores and partially worked artifacts or "blanks." Wadlow and LaDasso

found the same range of raw material, cores and "blanks" made from a variety of exotic raw materials. They indicate removing about 1650 pieces of stone, again reminiscent of the massive quantity described in McAdams' 1881 letter, Both McAdams and Wadlow-LaDassor found the mass of raw material and artifacts in the central burial feature. Apparently, McAdams found this material but did not remove it; it was later rediscovered and removed by Wadlow and LaDassor.

7) McAdams (1884) in his later published report on this excavation, indicates that the mound was located in the "Illinois River bottom, 15 miles from the mouth." He also notes that it was in Calhoun County. The Merrigan Mound is located in the bottomlands of the Illinois Valley, in Calhoun County, and almost exactly 15 miles upstream from the river mouth.

In sum, it appears that both McAdams and Wadlow-LaDassor excavated the Merrigan Mound. Using both McAdams' unpublished letter to Major Powell and the brief report by the latter excavators, it is possible to reconstruct a picture of the mound structure and contents.

The prehistoric builders stripped away the top soil from a small area and here prepared a "clay-lined" pit, 25 to 30 feet long, and 20 feet wide. The pit was filled with "white" sand in which at least 1,000 nodules, cores, preforms, etc. of flint, quartz, chalcedony, jasper and perhaps novaculite were buried. At least three articulated human skeletons were laid on top of this sand-filled pit. The aforementioned marine shell, copper and other artifacts were associated with these burials. Both McAdams and Wadlow-LaDassor indicate that much of the flint recovered at Merrigan was the well-known southern Illinois-Indiana hornstone. McAdams' 1881 letter describes the distinctive hornstone nodules very clearly. It is quite likely that many, if not all, of the 630 bifacially chipped "blanks" referred to by McAdams and removed by Wadlow and LaDassor were the hornstone disks that are a familiar mortuary association in Hopewell sites in Ohio, Illinois and elsewhere. These "blanks" were either in the sand pit fill or immediately on top of it with the skeletons.

Both McAdams and the later excavators describe evidence of fire around the edges of this central burial feature.

Primary and secondary conical mounds were then built over the central feature. No burials were found in the fill of either mound. A layer of limestone slabs was placed over the primary mound. Finally, two tertiary mounds were built, one slightly to the south, the other to the north of the central feature. These two mounds overlap at the feature, giving this tertiary earthwork an oval or elliptical plan view. Wadlow and LaDassor (1951) report discovering three intrusive burials in the two tertiary mounds.

Except for the three intrusive burials, the only skeletons recovered from the entire 175 by 50-foot Merrigan Mound came from the central feature which also yielded ALL of the aforementioned artifacts.

The concentrating of skeletons in a central feature in association with cere-

monial, or at least non-subsistence technology artifacts is another diagnostic characteristic of SOME Hopewell burial mounds in the Havana and Crab Orchard traditions in Illinois (Struever, 1965).

Evidence from the Wadlow-LaDassor excavations, along with surface surveys by the University of Michigan[1] and the writer, indicate Havana-Hopewell and Pike-Hopewell habitation sites located immediately adjacent to the Merrigan Mound, and the mound itself appears to have been built of soil from these sites.

Finally, this brief report calls to our attention the likelihood that the U.S. National Museum in Washington represents a potential reservoir of unpublished information on the excavations of the Bureau of Ethnology "Mound Survey" and other 19th century archeological projects in the eastern United States. The Smithsonian, as parent institution for the Bureau and the focal point of much late 19th century science in this country, was the organizer of and advisor to innumerable pioneer archeological undertakings. It also became the recipient of the collections and records of these projects, many of which—as in the case of McAdams' excavation of the Merrigan Mound—remain to be analyzed and described in the literature.

[1] **In April, 1948, an expedition of the University of Michigan, Museum of Anthropology, under the direction of Dr. James B. Griffin (personal communication) recovered 138 Havana and 23 Hopewell series sherds from the surface at Merrigan.**

REFERENCES CITED

Fowke, Gerard

1928 "Archaeological Investigations—II," Bureau of American Ethnology, 44th ANNUAL REPORT; pp. 530-532. Washington.

Griffin, James B.

1952 "Some Early and Middle Woodland Pottery Types in Illinois," in HOPEWELLIAN COMMUNITIES IN ILLINOIS (Thorne Deuel, ed.), Illinois State Museum, SCIENTIFIC PAPERS, Vol. 5, No. 3; pp. 93-129. Springfield.

n.d. "The Snyders Site, Calhoun County, Illinois," Greater St. Louis Archaeological Society; St. Louis.

McAdams, William Jr.
1884 "Mounds of the Mississippi Bottom, Illinois," Smithsonian Institution, ANNUAL REPORT FOR 1882; pp. 684-686. Washington.
1887 RECORDS OF ANCIENT RACES IN THE MISSISSIPPI VALLEY. C.R. Barns Publishing Co., St. Louis. 120 pp.

Mills, William C.
1916 "Exploration of the Tremper Mound," in CERTAIN MOUNDS AND VILLAGE SITES IN OHIO, Vol. 2, No. 3; pp. 105-240. Columbus.
1922 "Exploration of the Mound City Group," OHIO ARCHAEOLOGICAL AND HISTORICAL QUARTERLY, Vol. 31, No. 4; pp. 422-584. Columbus.

Struever, Stuart
1965 "Middle Woodland Culture History in the Great Lakes—Riverine Area," AMERICAN ANTIQUITY, Vol. 31, No. 2; pp. 211-223. Salt Lake City.

Struever, Stuart and Gail L. Houart
n.d. "An Economic Analysis of Hopewell," in PREHISTORIC ECONOMIC AND SUBSISTENCE PRACTICES (Edwin M. Wilmsen, ed.) IN PRESS.

Thomas, Cyrus
1894 "Report of the Mound Explorations of the Bureau of Ethnology," Bureau of Ethnology, 12th ANNUAL REPORT. Washington.

Wadlow, Walter and Gary LaDassor
1951 "Excavation Merigan Mound, Calhoun County, Illinois," Greater St. Louis Archaeological Society, BULLETIN No. 6; pp. 19-23. St. Louis.

Winters, Howard D.
1967 "An Archaeological Survey of the Wabash Valley in Illinois," Illinois State Museum, REPORT OF INVESTIGATIONS No. 10. Springfield.

EVIDENCE SUPPORTING THE THEORY OF CLIMATIC CHANGE AND THE DECLINE OF HOPEWELL

By Kent D. Vickery
Indiana University

The decadent character of early Late Woodland cultures as compared with the cultural florescense of Hopewell has long been recognized in the prehistory of the eastern United States. Among the theories which have been proposed concerning the decline of Hopewell, Griffin (1952:361) mentions the following: "cultural fatigue" (a concept borrowed from Kroeber involving a kind of cultural "stagnation"); the continuing destruction and burial of fine art products; and the disintegrating effect of encroaching Mississippian peoples.

Other attempts have since been made to account for the decline of Hopewell. Prufer (1964:66) mentions the possibility of a plague. He also believes that hilltop enclosures in Ohio were "terminal Hopewell" fortifications built for protection against invading Fort Ancient peoples. Elsewhere, Prufer (1965) has suggested that "certain disturbances" disrupted the elaborate Hopewell exchange network, and as a consequence, "the system itself, like a house of cards, began to collapse" (Prufer, 1965:136). Wray and MacNeish (1961:67) see the decline of Hopewell as the result of "internal political differences, or, possibly, a reassertion of local tribal independence after the use of agriculture had become familiar and trustworthy."

Most of the theories mentioned above are speculative, and remain untested by either contradictory or supporting evidence. Inferences such as cultural fatigue and internal political differences cannot easily be made from archaeological evidence alone, and explanations involving plagues or defensive measures against hostile cultures are simply unsubstantiated. Prufer's suggestion that the Hopewell exchange network was disrupted is probably true, but no explanation is offered as to what might have caused this.

In a later article, Griffin (1960a) recognized the unsatisfactory nature of earlier theories attempting to explain the decline of Hopewell, and proposed instead the ecological explanation which is summarized below.[1]

> The present paper suggests that a minor phase of cooler climate in the northern Mississippi Valley and Great Lakes areas was a significant contributing factor to a decline in the reliability of agricultural products, which in turn resulted in the decline from Hopewell, or Hopewell-Woodland, to early Late Woodland cultural forms (Griffin, 1960a:21-2).

Specifically, Griffin (1960a:28) noted that "The gradual decline and demise

[1] See also Griffin, 1960b, 1961a, 1961b, 1965 and 1967.

of the Hopewell culture in the Ohio and northern Mississippi Valley appears to correlate well with the cold period from around A.D. 200 to A.D. 700."

Griffin proposed the theory of climatic change as a major factor contributing to the decline of northern Hopewell only. A comparable climatic change cannot be documented in the southeastern United States, and it is significant to note that the southern expressions retained Hopewellian traits as they evolved into the later Weeden Island and related culture complexes.

Most of Griffin's evidence for climatic deterioration is derived from data in northern Europe, where paleoclimatologists have been able to reconstruct climatic sequences with a great deal of accuracy by the use of historic records. Such precise climatic reconstruction is not possible in the eastern United States, where pollen diagrams, some of which are radiocarbon-dated, must be relied on in the absence of written records. Griffin realized, however, that valid interpretations of climatic events in the northern Mississippi Valley must rely on these pollen studies. In attempting to use palynological data from this area, he reports the following major difficulty:

> Most of the American palynologists have been so intrigued with demonstrating the major climatic shifts of the post glacial period that they have not spent much time on any less apparent changes of the last 3000 to 4000 years (Griffin, 1960a:29).

Since this article was written, however, a number of relevant pollen studies have been made. It is to this more recent information that I have turned for data with which to re-examine Griffin's hypothesis.

EVIDENCE FOR MAIZE AGRICULTURE IN HOPEWELL

Griffin assumed that climatic deterioration toward the end of Hopewell had its greatest effect on the cultivation of corn. This discussion will therefore be limited to corn agriculture, although there is good evidence that other cultigens contributed to the Hopewell subsistence economy. In view of the fact that corn has recently been found in several Hopewell sites, it will be worthwhile to review the evidence for corn agriculture in the Middle Woodland period:

Wedel (1938:101, 1943:26), reports the discovery of corn at the Renner site in Platte County, Missouri[2]: "From pit 9, in a layer of charred grass 27 inches beneath the surface, were taken six short wide kernels of maize." From a more recent excavation at the Renner site, Roedl and Howard (1957:57) report "a kernel of what appears to be maize." Four radiocarbon dates were obtained from the Renner site: A.D. 1 $\pm$ 250 (M-572), A.D. 100 $\pm$ 200 (M-571), and A.D. 430 $\pm$200 (M-573), Crane and Griffin, 1959). A date published earlier, A.D. 680 $\pm$ 250 (M-454) Crane and Griffin, 1958), was rejected as being too late (Griffin,

[2]See Fig. 1 for location of archaeological sites.

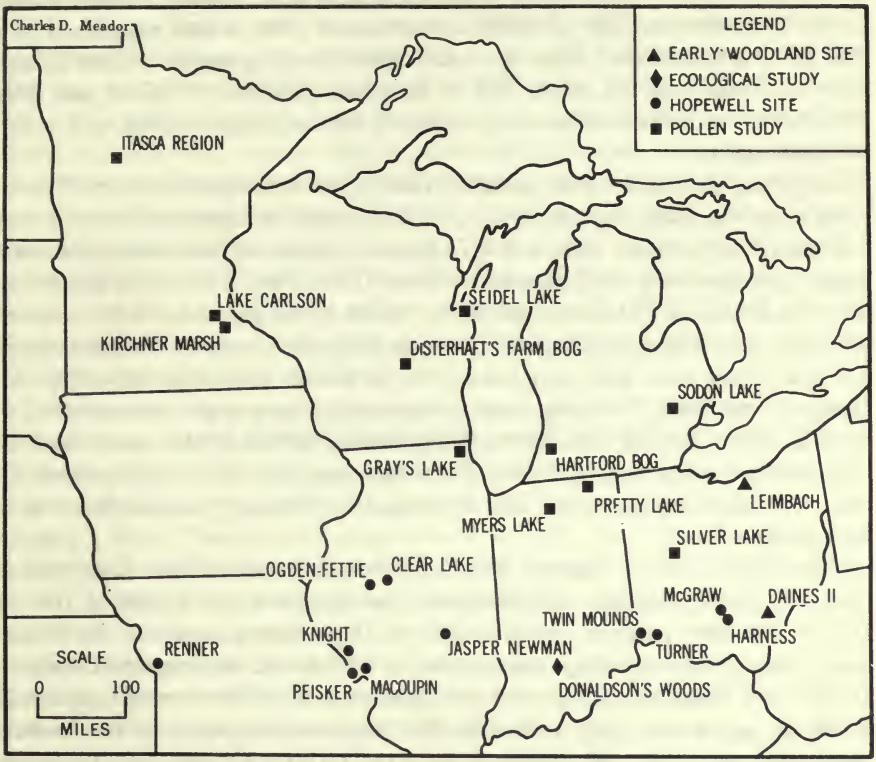


Figure 1. Location of archaeological sites and pollen studies mentioned in text.

1958:20).

The discovery of corn in Mound 4 of the Marksville group in Louisiana is mentioned by Fowke (1928:420-21) and Setzler (1933:14): "Among the remains was one decorated pot 2 inches high containing minute desiccated fragments of corn, squash, and perhaps other forms of food. A leaf, apparently a corn blade, had been placed over the top" (Fowke, 1928:420-21).

Corn from the Harness site is recorded by Putnam in a list of additions to the Peabody Museum: ". . .seeds, nuts, corn and grass, all charred. . .from mounds belonging to the Liberty group on the land of Edwin Harness, esq., in Liberty township, Ross Co., Ohio" (Putnam, 1886:426). In 1882, Putnam and Metz discovered corn in a fireplace near the center of Mound 1 of the Turner group in Hamilton County, Ohio: "Mixed with the ashes were charcoal, flint flakes, charred corn and corn-cobs" (Willoughby, 1922:29). The disposal of the corn from Harness and Turner is unknown, and consequently has not been analyzed.

Fowler (1952:169) recovered "a few fragments of charred corn" from the Clear Lake site in Tazwell County, Illinois. A Hopewell association for this

corn is assumed, but the context is not given, and Mississippian material is also known from the site. The possible occurrence of corn is also mentioned in a trait list for the Mitchell Mound of the Ogden-Fettie group in Fulton County, Illinois: "Corn stalk (?) below find of projectile points. . .1" (Cole and Deuel, 1937:181). No further information regarding the corn stalk is given, and it has not been analyzed.

Corn was discovered at the Knight (Ansell) site in Calhoun County, Illinois: "Not only was there more than a cupful of charred, well-preserved corn kernels, but mixed with them were a few fragments of charred cornstalks, and what might have been very small segments of husk" (McGregor, 1958:169). Hugh Cutler, who examined the corn, reports that "Most of the grains are from 12-rowed ears with relatively straight rows. . .The ears probably resembled the Guatemalan Tropical Flints more than they resembled the historic ears of the region" (in Mc Gregor, 1958:170). The Knight site is represented by a single radiocarbon date of A.D. 250 ± 300 (M-164, Crane, 1956). Griffin (1960a:24) has questioned the Hopewell association of this corn. He points out that the pit from which the corn was recovered contained Late Woodland and Mississippian sherds as well as Hopewell material.

The Peisker site in Calhoun County, Illinois, has yielded eight fragments of corn cob unquestionably associated with the Hopewell occupation of the site (Stuart Struever, personal communication). Hugh Cutler examined the Peisker corn, and reports an average row number of 12.5 for all cob fragments analyzed (Cutler and Blake, n.d.). The corn was associated with Pike ceramics, thus indicating an age of A.D. 100–A.D. 400. The Hopewell component of the Peisker site is represented by radiocarbon dates of A.D. 180 ± 130 (M-1405, Crane and Griffin, 1966); A.D. 70 ± 120 (M-1570), and A.D. 250 ± 120 (M-1569, Crane and Griffin, 1968).

William Gardner recovered corn from the Jasper Newman site in Moultrie County, Illinois: "Almost 2 ft. down in a pit containing nothing but Havana material some dozen fragments of maize were recovered" (in Hall, 1966:905). The corn was analyzed by Cutler, who reports an average of 10 rows per cob (Cutler and Blake, n.d.). Two radiocarbon dates were obtained from the Hopewell occupation of this site: 50B.C. ± 140 (M-1789) and 80 B.C. ± 140 (M-1790, Crane and Griffin, 1968). The latter date was obtained from charcoal taken from the pit which yielded the corn.

A partially carbonized ear of corn was recovered by Frank Rackerby in a pure Havana excavation unit at the Macoupin site in Jersey County, Illinois (Rackerby, 1969 and personal communication), and a single grain of maize pollen also associated with the Havana-Hopewell occupation of this site was identified by James Schoenwetter (personal communication). The cob fragment was analyzed by Cutler, who reports that it was 12-rowed (Cutler and Blake, n.d.). Samples for radiocarbon analysis have been submitted to the University of Michigan.

Prufer found "A medium-sized, 12-rowed ear. . .and a distorted medium-

sized kernel" (Cutler, 1965:107) at the late Hopewell McGraw site in Ross County, Ohio. Yarnell, who was present when the corn was discovered, reports that "No indication was found that could lead to a conclusion that the corn was not Hopewell" (Yarnell, 1964:105). Cutler examined the cob, and found it to be "larger than cobs of small 12-rowed flint and pop corns of the central and midwestern states; small when compared to cobs of the 8-rowed Northern Flints" (Cutler, 1965:108). Cutler also noted that the only preserved grain was slightly crescent-shaped, and came from an 8– or 10-rowed ear. Seven radiocarbon dates with a range of 230 B.C. to A.D. 481 were obtained from the McGraw site. Prufer (1965:104-6) accepts three of these as being most representative of this late Hopewell village: A.D. 440 ± 80 (UCLA-679 C. Berger, Fergusson, and Libby, 1965); A.D. 435 ± 166 (OWU-62) and A.D. 481 ± 65 (OWU-61, Ogden and Hay, 1964).

Several maize kernels and cob fragments were recently found at the Twin Mounds village site in Hamilton County, Ohio (Fred W. Fischer, personal communication). The corn was found scattered throughout the undisturbed portion of a basin-shaped depression. Analysis of the corn is being undertaken by Richard I. Ford. Radiocarbon dates are not available, but Fischer believes that the Hopewell component of this village site should date around A.D. 100 to A. D. 300, judging from the presence of McGraw Plain and McGraw Cordmarked ceramics in nearly equal amounts.

At the present time, the earliest reported occurrence of corn in the northern Mississippi Valley is from the Daines II mound in Athens County, Ohio, where James L. Murphy (personal communication) found a single carbonized ear of 10-rowed corn still enclosed in the husk (Hugh Cutler, personal communication; Cutler and Blake, n.d.). The corn was recovered from the undisturbed base of the mound, five feet from the outer edge. Murphy states that the mound is unquestionably Adena, as evidenced by the presence of a bark-covered burial, prepared clay floor, and Adena Stemmed points. The Daines II mound is represented by a radiocarbon date of 280 B.C. ± 140 [3].

The discovery of several carbonized corn kernels at the Leimbach site in Lorain County, Ohio, is another possible instance of maize in an Early Woodland context. The possibility that the corn might have been instrusive from the Late Woodland component of the site has not been dismissed, but it was recovered from an Early Woodland LEIMBACH PHASE feature near the top of a midden zone, and no internal disturbance by plowing or rodent activity was noted (Orrin C. Shane, III, personal communication). The corn will be submitted to Hugh Cutler for analysis. Radiocarbon dates of 520 B.C. ± 310 (OWU-185, Ogden and Hay, 1967); 510 B.C. ± 260 (OWU-250), and A.D. 15 ± 240 (OWU-251, Ogden and Hay, 1969) have been obtained from the site, but Shane rejects the latter two dates on the basis of associated artifacts and possible sample contamina-

[3]This sample was run by the University of Michigan.

tion. Since the only accepted date of 520 B.C. came from the bottom of the midden zone, Shane believes that if the corn is genuinely early, it probably dates to the first century B.C.

With the exception of the Leimbach site and the Daines II mound, all of the sites in which corn has been found are apparently Hopewell rather than more generalized Middle Woodland expressions in which typical Hopewell artifact classes are absent. [4] This does not imply that regional variability is lacking, but there may be a difference between the subsistence economies of Hopewell and other Middle Woodland cultures. Specifically, the cultivation of corn appears to be associated with the presence of Hopewell status items indicating participation in the Hopewell Interaction Sphere.

EVIDENCE FOR CLIMATIC CHANGE

Environmental reconstruction in palynology relies on the premise that the changes in vegetation observable in pollen diagrams reflect corresponding changes in climatic conditions. Occasionally they do not, since vegetation responds to a variety of factors in its environment, not all of which are climatic. The fact that vegetation is generally more sensitive to changes in climate than to anything else, however, justifies the use of pollen analysis as the most reliable method of climatic reconstruction in prehistory.

The pollen zones first defined by Deevey (1939) in the New England area have provided a model for the interpretation of pollen diagrams in the Midwest. Of particular interest is the beginning of pollen zone C–3, which is roughly contemporaneous with the end of the Hopewell period, and which provides evidence for a climatic shift to cooler and moister conditions.

Wright, Winter, and Patten (1963), who analyzed pollen from Lake Carlson and Kirchner Marsh in Dakota County, Minnesota, use the same zonal designations as those in New England. They observe that:

> The general dominant in the two areas are not necessarily the same–but the climatic changes implied by the vegetational changes correlate in a general way–the C Zones, with oak and various other tree genera dominant in Minnesota, imply in both areas a drying or warming followed by return to a moister or cooler climate (Wright, Winter, and Patten, 1963:1378).

The pollen spectrum from Kirchner Marsh shows that oak begins to attain maximum frequency slightly before sediments in the C–3 zone radiocarbon–dated at A.D. 290. The decline of oak correlates with an increase of pine at a slightly later date. In the Lake Carlson diagram, the oak maximum occurs at a comparable level. The authors reach the following conclusions from these two

[4] **See Struever (1965) and Prufer (1965) for discussions of the distinction between Hopewell and generalized Middle Woodland.**

pollen studies:

> In Zone C-c the recovery and dominance of the QUERCUS curve implies a return to moister conditions than those that prevailed during the Zone C-b interval—The regional rather than local character of the recorded vegetation is indicated by the same features, even in the minor curves, in both diagrams (Wright, Winter and Patten, 1963:1387).

The increase in pine is generally believed to signal the onset of a cooler climate in this area, if not a delayed immigration phenomenon (Wright, 1968).

McAndrews (1966, 1967) analyzed several pollen diagrams from an east-west transect across four counties in the Itasca region of northwestern Minnesota. He observed that "About 2,000 years ago PINUS pollen increased to over 35% in locations on the Itasca moraine; the presence of pine trees and the arrival of the modern pine-hardwood forest is thereby indicated" (McAndrews, 1967:234). He concludes that "the invasion and subsequent dominance of pine on Itasca moraine is attributed to decreased summer temperatures, a shortening of the growing season, and an increase in winter snowfall" (McAndrews, 1966:66).

The pine maximum has also been encountered in pollen diagrams in the Michigan area. Zumberge and Potzger (1956:283) observe that "Since the end of the Xerothermic, an increase in pine at the Hartford site (O- to 2-foot levels) suggests climatic deterioration." From pollen studies at Sodon Lake in Oakland County, Michigan, Cain and Slater (1948) define Period V as a zone which represents "the recent period which seems to be cooler and more moist than IV" (Cain and Slater, 1948:499).

West (1961) has noted the dominance of oak and pine and an increase in birch in Zone 8 of the Disterhaft's Farm Bog pollen diagram in Green Lake County, Wisconsin, possibly indicating the presence of an oak savanna type of vegetation in this part of the Great Lakes following Xerothermic. The presence of oak, pine, elm, and beech, as well as an increase in birch and the appearance of hemlock characterize Zone 8 in the nearby Seidel Lake diagram in Kewaunee County, thus indicating the establishment of the modern Lake Forest.

At Gray's Lake in Lake County, Illinois, Sears (1963) noted the presence of an oak maximum between two hickory maxima. He concludes that the oak maximum probably represents a dry period, but that "the two CARYA maxima suggest somewhat more humid intervals" (Sears, 1963:426). The upper hickory maximum correlates with the period of Hopewell decline.

The existence of beech-maple maxima along the C-1/C-2 and C-2/C-3 boundaries is generally recognized in many of the diagrams from Indiana and Ohio. Frey (1959) recognized the presence of a beech maximum at the C-2/C-3 boundary in his pollen diagram from Myers Lake in Marshall County, Indiana. He observed that "This is a fairly typical sequence for the central Midwest, of gradual warming to a maximum in C2 time, with a dry period corresponding to the CARYA peak, followed by cooling and a moister climate" (Frey, 1959:134).

From a radiocarbon-dated pollen diagram from Pretty Lake in LaGrange County, Indiana, Alice S. Jones (personal communication) found that beech and maple began to increase in sediments dated at A.D. 120. Both attained maximum frequency at a later date. The boundary between zones 3b and 3c in Ogden's (1966) diagram from Silver Lake in Logan County, Ohio, is bracketed by radiocarbon dates of A.D. 640 and A.D. 790. The rise in the percentage of beech and maple pollen, however, begins in the earlier 3b zone, and peaks in sediments above the 3b/3c boundary..

Ogden offers the following statement on the correlation of these two pollen spectra:

> . . .the extraordinary correspondence between Pretty Lake and Silver Lake, Ohio, pollen records indicates that present vegetational differences between the two areas have existed for at least 10,000 yr and that vegetational changes have been in phase and apparently synchronous (Ogden, 1969:144).

The studies of Potzger (1946, 1948), Engelhardt (1960), and others substantiate the widespread nature of this climatic deterioration toward the end of Hopewell. To demonstrate the effect that this shift could have had on the cultivation of corn, however, it is necessary to determine the effect it could have had on the growing season.

CORRELATION OF CLIMATE AND GROWING SEASON

Lindsey and Schmelz (1965) undertook a study of Donaldson's Woods in Lawrence County, Indiana. They found that during the decade of 1954 to 1963, the forest had changed from a mixed deciduous stand to a forest dominated primarily by beech and maple. Specifically, the authors observe that

> . . .during the decade, the combined density of beech and sugar maple increased in nearly all size-classes, while oaks and hickories lost numbers in all classes below 22 in d.b.h. This clearly suggests a future shift from mixed mesophytic composition to beech-maple (Lindsey and Schmelz, 1965:176).

The Paoli weather station, located 13 miles from the forest, has maintained climatic records since 1899. When the authors consulted these records, they found that the average precipitation for the period April 1 to August 31 was 19.4" for the years 1899 to 1953, as compared with an average of 21.2" for the years 1954 to 1963. The average temperature for the same period was 68.3° for the years 1899 to 1953, as compared with an average of 67.1° for the years 1954 to 1963. In other words, the decade of 1954 to 1963 saw a 1.8" average increase in precipitation, and 1.2° decrease in temperature.

Lindsey and Schmezl summarize their findings as follow: "Thus, the decade which saw beech-maple increase and oak-hickory decline had climate consis-

tent with this change, i.e., moister and cooler than normal" (Lindsey and Schmelz, 1965:176).

A review of the climatic records from Paoli revealed that the average length of the growing season for the years 1899 to 1953 was 172 days, as compared with an average of only 158 days for the years 1954 to 1963. This represents a reduction of 14 days in the length of the growing season for the decade in which beech and maple achieved dominance in the forest.

Yarnell (1964) has recently undertaken studies of present-day climate and growing season data as related to prehistoric site distribution in the Great Lakes area. He determined that the average length of the frost-free period for the entire area is 158 days. Hopewell sites that have produced the remains of cultivated plants, however, are not found in areas with less than an average of 170 frost-free days. Both Yarnell (1964:132) and Struever (1964:99) agree that the length of the frost-free period may have been a factor in the selection of site locations by prehistoric peoples in the northern Mississippi Valley, and Yarnell believes that this site selection probably resulted from "agricultural experience."

Yarnell was unable to find any early historic reports of corn growing in an area with an average frostless season of less than 120 days, nor was he able to find any prehistoric sites with corn outside of areas that today mark the 120-day average frost-free period. He concludes that:

> . . .the Indians who lived in areas where the frost-free period was less than 120 days could not depend upon maize agriculture for subsistence, nor could they do so in areas with longer frost-free periods where other climatic factors and soil conditions or physiography were not suitable (Yarnell, 1964: 129).

DISCUSSION

Even though the ecological study of Donaldson's Woods and the growing season data provided by Yarnell are based on present-day climate, both are valuable because of their ability to reveal trends which may have been operative in the past. The study of Donaldson's Woods, for example, provides a model for the interpretation of pollen diagrams featuring a beech-maple maximum. The dominance of these two species was achieved in only 10 years, reflecting the vegetational responses to a slight climatic shift toward cooler and moister conditions. It was shown that a 1.8" increase in precipitation and a 1.2°decrease in temperature also shortened the growing season by 14 days in the same 10-year period.

If we accept Yarnell's conclusion that a 120-day growing season was necessary for the reliable cultivation of corn, we may assume that a climatic fluctuation resulting in a 14-day reduction in the length of the growing season every

10 years could reduce the frost-free period in any particular area to less than 120 days in a matter of a few years. For a culture located in an area of 190 frost-free days, for example, it is possible that the cultivation of corn would become unreliable in a period of only 50 years.

I am not suggesting that corn agriculture became undependable in a matter of 50 or even 100 years following the onset of the climatic deterioration. The changing climate was most likely a gradual trend with many minor fluctuations which made the cultivation of corn possible for certain years when a late killing frost lengthened the growing season. It is also possible that certain cultures were situated in areas with unusually long growing seasons.

It is as difficult to determine exactly when the Hopewell to Late Woodland transition occurred as it is to delimit the period of climatic deterioration. Both the pollen and archaeological evidence, however, suggest that by about A.D. 400-450, the decline of Hopewell and the climatic shift were nearly complete.

From the occurrence of corn in Hopewell and later sites, it appears that the climatic shift caused the cultivation of corn to be abandoned.

Corn grown during the Hopewell period is of the small-eared, 10- to 14-rowed variety sometimes referred to as Tropical Flint (Cutler and Blake, n.d.). Another type of corn, called Basketmaker, is usually 12-rowed, but is a later variety. It is found in the Cahokia region, where it was able to survive well into Mississippian times because of an unusually long frost-free growing season in the area (Yarnell, 1964:114, 135). Some post-Hopewell corn shows characteristics of both Basketmaker and another variety of corn known as Eastern Complex or Northern Flint. Eastern Complex corn is large-eared and 8-rowed, and probably diffused from the Southwest (Galinat and Gunnerson, 1963). It is of common occurrence in Fort Ancient and Mississippian sites throughout the northern Mississippi Valley, and is occasionally found in Late Woodland contexts.

There is no clear evidence that either Basketmaker or Eastern Complex corn evolved directly from the 10- to 14-rowed corn grown in the Hopewell period. At the present time, the latest occurrence of Hopewell corn is from the Mc Graw site, which dates around A.D. 450. There seems to be a gap in the cultivation of maize from this time until about A.D. 700-800 (Cutler, personal communication), a date which corresponds well with the introduction of 8-rowed maize into the eastern United States. Any occurrence of corn between these dates will most likely be restricted to areas with unusually long growing seasons.

It appears that the Tropical Flint corn could not survive the shift to a cooler and moister climate, and the cultivation of this type of corn had to be abandoned toward the end of the Hopewell period. About A.D. 700-800, a better-adapted and higher-yielding corn diffused from the Southwest, and continued to be grown well into Mississippian times. This theory is supported by Yarnell's study, where he found that the average length of the frost-free period for all sites which have yielded Eastern Complex corn is 159 consecutive days, while

those with corn of "other types" average 190 days. This suggests that the Eastern Complex corn was better adapted to the environment, for apparently it could mature in a shorter growing season than that required for the earlier Hopewell corn.

The theory of a climatic change affecting corn agriculture toward the end of Hopewell is supported by the data presented above. Several archaeologists, however, have taken issue with Griffin concerning this theory.

Prufer, for example, believes that

> . . .it is debatable whether the climatic deterioration postulated by Griffin for the northern Mississippi Valley was of sufficient intensity to cause a substantial change in agricultural productivity (Pruefer, 1964:66).

Yarnell, however, implies that even a mild climatic fluctuation can have a disastrous effect on the cultivation of corn:

> In addition to minimum growing season, crops require adequate night temperatures, daytime temperatures, and average temperatures for certain lengths of time before they will mature. They also need enough, but not too much, moisture and sunshine. Thus, all minimum conditions must be met before a crop can mature (Yarnell, 1964: 149).

I would suggest that the minimum conditions for the growth of corn as mentioned by Yarnell were not met after the onset of climatic deterioration.

Baerreis and Bryson (1965) have proposed a sequence of "climatic episodes" in which the European-derived Sub-Atlantic period is correlated with Hopewell. The Sub-Atlantic, which lasted from about 500-600 B.C. to A.D. 300-400, is characterized by a "more severe" climate. Following the Sub-Atlantic is a warmer period which lasted until about A.D. 800-900. This period is labeled the "Scandic episode."

The authors explain why the Sub-Atlantic is a period of more severe climate: "It is the glacial advances and associated eustatic Roman Emergence that justify in any way the term "more severe" (Barreis and Bryson, 1965:215). The following "Scandic episode" is so named because of a climatic amelioration in Greenland, Iceland and Scandinavia.

Apparently, Baerreis and Bryson are forced to rely on paleoclimatological evidence from other parts of the world because "Little direct evidence is available from the Wisconsin-Great Lakes region to support the interpretation of the character of the late climatic episodes" (Baerreis and Bryson, 1965:218). In the preceeding pages, I have shown that there is ample evidence in the form of pollen studies in the northern Mississippi Valley. Furthermore, the concept of the "Sub-Atlantic" is not universally applicable, a fact which the authors themselves acknowledge. In the Southwest, for example, this period is characterized by a warmer climate.

In Baerreis and Bryson's scheme, the transition from the Sub-Atlantic to the Scandic would involve a climatic shift from cooler to warmer conditions. I suggest that this interpretation be abandoned in favor of the hypothesis of climatic deterioration for the following reasons:

1) Baerreis and Bryson's conclusions are based on data derived from other parts of the world, while the pollen studies cited above constitute direct evidence from the northern Mississippi Valley;

2) Vegetational changes in pollen diagrams reflect climatic changes more rapidly and more accurately than the movement of glaciers or the rise and fall of sea levels.

Cleland (1966) adopts a critical attitude toward Griffin's hypothesis, but fails to offer climatological evidence supporting his contradictory interpretations. Apparently, he feels that the acceptance of Baerreis and Bryson's climatic episodes is sufficient justification for ignoring the pollen evidence available from the Great Lakes region. It is significant to note that Celland fails to cite even a single pollen study to support his claim that the "Hopewell Episode," which lasted from 300 B.C. to A.D. 300, was a period of cooler climate, although pollen evidence figures prominently in his discussions of earlier climatic periods. Following Barreis and Bryson, Cleland believes that the "Scandic Episode" was a period of warmer climate.

Cleland cites his reasons for rejecting Griffin's hypothesis in the following statement:

> Griffin anticipated one of the potential weaknesses in his theory by predicting that it would be criticized on the grounds that it has not been demonstrated that Hopewellian culture was reliant upon maize agriculture. Not only is this still true, but most of the corn which has been reported from Middle Woodland sites is from sites which date during the latter part of this period, the period of supposed climatic-deterioration (Cleland, 1966:28).

There is little doubt that sites such as Renner, McGraw, and Turner are late Hopewellian manifestations, but this is not true of other Hopewell sites where corn has been found. The 280 B.C. and 80 B.C. radiocarbon dates for the Daines II mound and the Jasper Newman site, as well as the possible occurrence of corn in the Early Woodland period at the Leimbach site, attest to the early cultivation of maize in the northern Mississippi Valley.

Cleland's other criticism concerns one of the basic assumptions of Griffin's hypothesis, and deserves further consideration. The problem is obviously one of trying to assess the role of corn in the Hopewell subsistence economy, for it is doubtful if any Hopewellian cultures were reliant exclusively upon maize agriculture.

Struever (1968) believes that agriculture was practiced by some Hopewell cultures, but suggests that a pattern of "Intensive Harvest Collecting" may have

obtained in certain locales. Struever's concept of Intensive Harvest Collecting, which is closely related to Caldwell's (1958) idea of "primary forest efficiency," involves:

> . . .an adaptation centering on exploitation of SELECTED, HIGH–YIELDING natural food resources characteristic of certain biomes that have a sharply restricted geographic distribution within the woodlands of northeastern United States (Struever, 1968:305).

I do not regard Struever's concept of Intensive Harvest Collecting as inconsistent with the evidence for corn agriculture among some Hopewell peoples. Perhaps local environmental adaptations favored one over the other, but I hardly think that agriculture and intensive gathering need be mutually exclusive. The fact that more and more Hopewell sites with corn continue to be found, however, in addition to the recent evidence for corn in the Adena period, leads me to the conclusion that corn may have played a more important role in the Hopewell subsistence economy than has formerly been suspected.

The number and distribution of Hopewell sites which have yielded corn provides evidence that the knowledge of maize cultivation was widespread, and implies that it was of some importance to all Hopewell cultures in the northern Mississippi Valley. Furthermore, corn does not reproduce year after year—it must be cultivated and tended by man. Whenever corn is found in an archaeological site, deliberate planting, purposeful storage, and conscious selection from a previous harvest is indicated (Griffin, personal communication). For these reasons, it seems to me that the contribution of corn to the Hopewell diet was considerably greater than is indicated by the few kernels or cob fragments that have been accidentally preserved by charring at any particular site.

If a climatic shift to cooler and moister conditions forced those cultures formerly dependent to a large degree upon maize agriculture to revert to a subsistence economy based primarily on hunting and gathering, it is unlikely that the Interaction Sphere could have been sustained. The withdrawal of certain strategically-located cultures having access to the sources of important raw materials may have caused the breakdown of the Interaction Sphere and paved the way for the transition to early Lake Woodland.

CONCLUSION

Griffin's theory of climatic change will be supported or contradicted only by continued excavations of Hopewell sites which yield evidence of subsistence activities, and by additional pollen studies in which greater emphasis is placed on the delimitation of climatic fluctuations during the past 2000 years. If Struever and Yarnell are correct in their belief that prehistoric peoples in the northern Mississippi Valley selected sites on the basis of the growing season, it would be

valuable to investigate Hopewell sites which are located in areas with long frost-free periods and possessing other environmental conditions favorable to the growth of corn and other cultigens.

Considering the present state of our knowledge about the Hopewell to Late Woodland transition, Griffin's theory of climatic change seems to be a valid explanation for the decline of Hopewell.

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REFERENCES

Barreis, David A., and Reid A. Bryson
1965 "Climatic Episodes and the Dating of the Mississippian Cultures," THE WISCONSIN ARCHEOLOGIST, 46:203-20.

Berger, Rainer, G.J. Fergusson, and W.F. Libby
1965 "UCLA Radiocarbon Dates IV," RADIOCARBON, 7:336-71.

Cain, Stanley A., and J.V. Slater
1948 "Palynological Studies at Sodon Lake, Michigan, Part III. The Sequence of Pollen Spectra, Profile I, " ECOLOGY, 29: 492-500.

Caldwell, Joseph R.
1958 TREND AND TRADITION IN THE PREHISTORY OF THE EASTERN UNITED STATES. American Anthropological Association, Memoir No. 88.

Cleland, Charles Edward
1966 THE PREHISTORIC ANIMAL ECOLOGY AND ETHNOZOOLOGY OF THE UPPER GREAT LAKES REGION. University of Michigan, Museum of Anthropology, Anthropological Papers No. 29. Ann Arbor.

Cole, Fay-Cooper, and Thorne Deuel
1937 REDISCOVERING ILLINOIS. Chicago: University of Chicago Press

Crane, H.R.
1956 "University of Michigan Radiocarbon Dates I," SCIENCE, 124: 664-72.

Crane, H.R. and James B. Griffin
1958 "University of Michigan Radiocarbon Dates III, "SCIENCE, 128: 1117-23.
1959 "University of Michigan Radiocarbon Dates IV," RADIOCARBON SUPPLEMENT, 1:173-98.
1966 "University of Michigan Radiocarbon Dates XI," RADIOCARBON 8:256-85
1968 "University of Michigan Radiocarbon Dates XII," RADIOCARBON 10:61-114.

Cutler, Hugh C.
1965 "Cultivated Plants" in THE MCGRAW SITE: A STUDY IN HOPEWELLIAN DYNAMICS, Olaf H. Prufer, pp. 107-12. Cleveland Museum of Natural History, Scientific Publications, New Series, Vol. 4, No. 1. Cleveland.
Personal Communication. Letter dated May 28, 1969.

Cutler, Hugh C., and Leonard W. Blake
n.d. "An Adena Corn Ear from the Daines II Mound, Athens, Ohio." (In Preparation).

Deevey, Edward S., Jr.
1939 "Studies on Connecticut Lake Sediments. I.A. Postglacial Climatic Chronology for Southern New England," AMERICAN JOURNAL OF SCIENCE, 237:691-724.

Engelhardt, Donald W.
1960 "A Comparative Pollen Study of Two Early Wisconsin Bogs in Indiana," PROCEEDINGS, INDIANA ACADEMY OF SCIENCE, 69: 110-8.

Fischer, Fred W.
Personal Communication. Letter dated May 31, 1969.

Fowke, Gerard
1928 "Archeological Investigations--II," BUREAU OF AMERICAN ETHNOLOGY, 44th ANNUAL REPORT, pp. 399-540. Washington, D.C.

Fowler, Melvin L.
1952 "The Clear Lake Site: Hopewellian Occupation" in HOPEWELLIAN COMMUNITIES IN ILLINOIS, ed. Thorne Deuel, pp. 133-74. Illinois State Museum, Scientific Papers, Vol. 5. Springfield.

Frey, David G.
1959 "The Two Creeks Interval in Indiana Pollen Diagrams, "INVESTIGATIONS OF INDIANA LAKES AND STREAMS, 5:131-9.

Galinat, Walton C., and James H. Gunnerson
1963 "Spread of Eight-Rowed Maize from the Prehistoric Southwest," HARVARD UNIVERSITY, BOTANICAL MUSEUM LEAFLETS, 20:117-60.

Griffin, James B.
1952 "Culture Periods in Eastern United States Archeology" in ARCHEOLOGY OF EASTERN UNITED STATES, ed. James B. Griffin, pp. 352-64. Chicago: University of Chicago Press.

1958 THE CHRONOLOGICAL POSITION OF THE HOPEWELLIAN CULTURE IN THE EASTERN UNITED STATES. University of Michigan, Museum of Anthropology, Anthropological Papers No. 12. Ann Arbor.

1960a "Climatic Change: A Contributory Cause of the Growth and Decline of Northern Hopewellian Culture," THE WISCONSIN ARCHEOLOGIST, 41:21-33.

1960b "A Hypothesis for the Prehistory of the Winnebago" in CULTURE IN HISTORY: ESSAYS IN HONOR OF PAUL RADIN, ed. Stanley Diamond, pp. 809-65. New York: Columbia University Press.

1961a "Post-Glacial Ecology and Culture Changes in the Great Lakes Area of North America," University of Michigan, GREAT LAKES RESEARCH DIVISION, INSTITUTE OF SCIENCE AND TECHNOLOGY, Publication 7, pp. 147-55. Ann Arbor.

1961b "Some Correlations of Climatic and Cultural Change in Eastern North American Prehistory," ANNALS, NEW YORK ACADEMY OF SCIENCES, 95:710-17.

1965 "Lake Quaternary Prehistory in the Northeastern Woodlands" in THE QUATERNARY OF THE UNITED STATES, ed. H.E. Wright, Jr., and David G. Frey, pp. 655-67. Princeton: Princeton University Press.

1967 "Climatic Change in American Prehistory" in THE ENCYCLOPEDIA OF ATMOSPHERIC SCIENCES AND ASTROGEOLOGY, ed. Rhodes W. Fairbridge, pp. 169-71. New York: Reinhold Publishing Corporation.

Hall, Robert L. (Ed.)
1966 "Current Research–Northern Mississippi Valley," AMERICAN ANTIQUITY, 31:904-8.

Lindsey, Alton A., and Damian V. Schmelz
1965 "Comparison of Donaldson's Woods in 1964 with its 1954 Forest Map of 20 Acres," PROCEEDINGS, INDIANA ACADEMY OF SCIENCE, 74:169-77.

McAndrews, John H.
1966 "Postglacial History of Prairie, Savanna, and Forest in Northwestern Minnesota," MEMOIRS OF THE TORREY BOTANICAL CLUB, 22:1-72.

1967 "Pollen Analysis and Vegetational History of the Itasca Region, Minnesota," in QUATERNARY PALEOECOLOGY, ed. E.J. Cushing and H.E. Wright, Jr., pp. 219-36. New Haven: Yale University Press.

McGregor, John C.
1958 THE POOL AND IRVING VILLAGES. Urbana: University of Illinois Press.

Murphy, James L.
Personal Communication. Letter dated July 24, 1969.

Ogden, J. Gordon, III
1966 "Forest History of Ohio. I. Radiocarbon Dates and Pollen Stratigraphy of Silver Lake, Logan County, Ohio," THE OHIO JOURNAL OF SCIENCE, 66:387-400.

1969 COMMENT in "Ohio Wesleyan University Natural Radiocarbon Measurements IV," J. Gordon Ogden, III, and Ruth J. Hay, RADIOCARBON, 11:137-49.

Ogden, J. Gordon, III, and Ruth J. Hay
1964 "Ohio Wesleyan University Natural Radiocarbon Measurements I," RADIOCARBON, 6:340-8.

1967 "Ohio Wesleyan University Natural Radiocarbon Measurements III," RADIOCARBON, 9:316-32.

Potzger, J.E.
1946 "Phytosociology of the Primeval Forest in Central-Northern Wisconsin and Upper Michigan, and a Brief Post-Glacial History of the

Lake Forest Formation," ECOLOGICAL MONOGRAPHS, 16:211-50.

1948 "A Pollen Study in the Tension Zone of Lower Michigan, " BUTLER UNIVERSITY BOTANICAL STUDIES, 8:161-77.

Prufer, Olaf H.

1964 "The Hopewell Complex of Ohio," in HOPEWELLIAN STUDIES, ed. Joseph R. Caldwell and Robert L. Hall, pp. 35-83. Illinois State Museum, Scientific Papers, Vol. 12, No. 3. Springfield.

1965 THE MCGRAW SITE: A STUDY IN HOPEWELLIAN DYNAMICS. Cleveland Museum of Natural History, Scientific Publications, New Series, Vol. 4, No. 1. Cleveland.

Putnam, F.W.

1886 "Report of the Curator" in EIGHTEENTH AND NINETEENTH ANNUAL REPORTS OF THE TRUSTEES pp. 401-32. Peabody Museum of American Archaeology and Ethnology, Vol. 3, Nos. 5 and 6. Cambridge.

Rackerby, Frank

1969 "The Macoupin Site: A Lower Illinois Valley Middle Woodland Settlement." Paper read at the 34th Annual Meeting of the Society for American Archaeology. Milwaukee, May 1-3, 1969.

Personal Communication. Letter dated May 16, 1969.

Roedl, Leo J., and James H. Howard

1957 "Archaeological Investigations at the Renner Site," THE MISSOURI ARCHAEOLOGIST, 19:52-96.

Sears, Paul B.

1963 "A Latent Record in the Prairie Woodland Ecotone," GRANAPALYNOLOGICA, 4:424-7.

Setzler, Frank M.

1933 "Pottery of the Hopewell Type from Louisiana," PROCEEDINGS, US NATIONAL MUSEUM, Vol. 82, Art. 22, pp. 1-21.

Shane, Orrin C., III

Personal Communication. Letter dated May 14, 1969.

Struever, Stuart
1964 "The Hopewell Interaction Sphere in Riverine-Western Great Lakes Culture History" in HOPEWELLIAN STUDIES, ed. Joseph R. Caldwell and Robert L. Hall, pp. 85-106. Illinois State Museum, Scientific Papers. Vol. 12, No. 3. Springfield.

1965 "Middle Woodland Culture History in the Great Lakes Riverine Area," AMERICAN ANTIQUITY, 31:211-23.

1968 "Woodland Subsistence-Settlement Systems in the Lower Illinois Valley" in NEW PERSPECTIVES IN ARCHEOLOGY, ed. Sally R. Binford and Lewis R. Binford, pp. 285-312. Chicago: Aldine Publishing Co.

United States Weather Bureau
1939-1963
CLIMATOLOGICAL DATA. Superintendent of Documents. Washington, D.C.

United States Department of Agriculture
1941 "Climates of the States–Indiana" in CLIMATE AND MAN, pp. 852-61. Yearbook of Agriculture. Washington, D.C.

Wedel Waldo R.
1938 "Hopewellian Remains near Kansas City, Missouri," PROCEEDINGS, US NATIONAL MUSEUM,Vol. 86, No. 3045, pp. 99-106.

1943 ARCHEOLOGICAL INVESTIGATIONS IN PLATTE AND CLAY COUNTIES, MISSOURI. US National Museum, Bulletin 183. Washington, D.C.

West, R.G.
1961 "Late–and Postglacial Vegetational History in Wisconsin, Particularly Changes Associated with the Valders Readvance," AMERICAN JOURNAL OF SCIENCE, 259:766-83.

Willoughby, Charles C.
1922 THE TURNER GROUP OF EARTHWORKS, HAMILTON COUNTY, OHIO. Papers of the Peabody Museum of American Archaeology and Ethnology, Vol. 8, No. 3. Cambridge.

Wray, Donald E., and Richard S. MacNeish
1961 THE HOPEWELLIAN AND WEAVER OCCUPATIONS OF THE WEAVER SITE, FULTON COUNTY, ILLINOIS. Illinois State Mu-

seum, Scientific Papers, Vol. 7, No. 2. Springfield.

Wright, H.E., Jr.
1968 "The Roles of Pine and Spruce in the Forest History of Minnesota and Adjacent Areas," ECOLOGY, 49:937-55.

Wright H.E., Jr., Thomas C. Winter, and Harvey L. Patten
1963 "Two Pollen Diagrams from Southeastern Minnesota: Problems in the Regional Late Glacial and Postglacial Vegetational History," BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA, 74:1371-96.

Yarnell, Richard Asa
1964 ABORIGINAL RELATIONSHIPS BETWEEN CULTURES AND PLANT LIFE IN THE UPPER GREAT LAKES REGION. University of Michigan, Museum of Anthropology, Anthropological Papers No. 23. Ann Arbor.

Zumberge, James H., and John E. Potzger
1956 "Late Wisconsin Chronology of the Lake Michigan Basin Correlated with Pollen Studies, " BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA, 67:271-88.

ANOTHER RADIOCARBON DATE FOR THE OCONTO SITE

By Robert Ritzenthaler

Through the efforts of Mr. Jack Steinbring and the sponsorship of the University of Winnipeg a bone sample from Feature 15, Oconto Site was analyzed by the Gakushvin University, Tokyo, radiocarbon laboratory. It was dated at 4,540 +–400 (B.P.–1950) or 2,590 B.C.

This fits in very reasonably with the dates for other Old Copper sites and is more believable than the dates of 7510 and 5600 previously obtained for Oconto. The latter two were done in the early days of radiocarbon analysis when the runs were made on solid carbon rather than conversion to gas and less apt to be reliable.

On the basis of the Tokyo date Oconto would appear to remain the oldest of the Old Copper sites with B.P. dates for the other sites running as follows: Osceola-3450. Reigh-3660, and Riverside–six dates ranging from 1950 to 3040.

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by Guy E. Gibbon

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THE MIDWAY VILLAGE SITE: An Orr Phase Oneota Site in the Upper Mississippi River Valley

Guy E. Gibbon
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INTRODUCTION

Middle Mississippi cultures are regional representatives of an agricultural, sedentary way of life generally known as the Mississippian tradition in the eastern United States. The roots of this lifeway begin to appear in the Middle Mississippi Valley between A.D. 700-800. Oneota designates a number of distinctive prehistoric and early historic complexes in the Upper Mississippi drainage system exhibiting some "Mississippian" traits. The Oneota settlement-subsistence patterns reflect a less complex level of sociocultural integration and a greater reliance upon hunting-gathering activities, than is typical of the Middle Mississippi pattern. Hypotheses as to the relationship of Oneota and Middle Mississippi cultures have proffered explanations attempting to account for the less complex nature of Oneota. This research project was designed to test one facet of one of these hypotheses.[1]

James B. Griffin has suggested that the Oneota cultural complex developed from a northern push of Middle Mississippi peoples during the Neo-Atlantic warm period (1960, 1961). A marked climatic change which began in approximately A.D. 1300 produced a relatively cool period that was extreme enough, Griffin argued, to affect the horticultural practices on which the northernmost Middle Mississippi cultures were partially based (1961:710-712). The Middle Mississippi cultures:

> "shifted away from a marked dependence on agriculture to a heavier emphasis on hunting, and. . .there was a marked drop in cultural level. This period of gradual decline can now be clearly seen as occurring in the A.D. 1300 to 1650 time period" (ibid.).

As the cultural patterns of these northern complexes adjusted to a new subsistence base, the characteristics, which are now recognized as typifying Oneota, emerged.

Some Oneota sites in Wisconsin are very large. The Shrake-Gillies site in Trempealeau County is reported to cover an area of about forty acres, and the Midway site in LaCrosse County to cover an area of approximately thirty-five

acres (McKern, 1945:123-124). Aztalan, the largest Middle Mississippi site in Wisconsin, occupies an area enclosed within a stockade of only twenty-one acres. The relative sizes of these sites leads to the formulation of an interesting problem. If the agricultural potential of the Middle Mississippi culture was curtailed to such an extent that a deterioration in culture resulted, a decrease in the size of the village community would be expected and not an increase of the proportion found between Aztalan and the larger Oneota sites. The apparent large size of these sites could be the result of course of other factors such as intermittant occupation by small groups. This project was initiated to test the degree of intrasite cultural homogeneity at the Midway site of the Orr Phase. The description of the recovered material and the relationship of the site to other Orr Phase components were also considered integral objectives of the project.

An attempt has been made in the organization of the report to separate the factual data from the interpretations presented by the writer. The primary reason for this approach is to facilitate comparative research by not encumbering the data with interpretations that are subject to revision. Interpretations derived from the data are presented in a separate section. This latter section is followed by a general conclusion in which the problems pertinent to this report are reviewed.

SITE HISTORY

The Midway village site, 47LC19, is situated in the S.W. ¼ of the S.W. ¼, Sec. 18, T. Onalaska, R. 7W., La Crosse County, Wisconsin, where Halfway Creek and County Trunk XX intersect. The site was dug to some extent by Professor A.H. Sanford of La Crosse State College (now university) in the early 1920's and was subjected to a more intensive investigation in 1929 by a party under the direction of W. C. McKern of the Milwaukee Public Museum. The results of the latter excavation were subsequently mentioned in two reports written by McKern (1931, 1945). Except for this partially described excavation, no other recorded investigations have been conducted at the site prior to this report. The site has been extensively cultivated at least since the turn of the century and has long been a favorite of the private collectors in the area.

SITE DESCRIPTION

The topographic setting of the site is a fairly level area along the outer edge of the Midway-New Amsterdam terrace system in the Gorge of the Upper Mississippi River Valley. The site is sixty feet above the adjoining flood plains of the

[1]**This report is a condensed version of a Master's thesis prepared under the guidance and at the suggestion of Dr. David A. Baerreis (Gibbon, 1966).**

Black and Mississippi Rivers and one mile from the main river channel. The gorge is part of the geographical area described as the Western Uplands. This upland region is within the unglaciated or "Driftless" area of southwestern Wisconsin and adjacent parts of Illinois, Iowa and Minnesota. The region is characterized by a broad humid-continental type of climate having four seasons. The natural vegetation of the gorge is part of the Oak sub-climax of the North Central United States (Curtis, 1959).

The site surface is treeless and has been under cultivation for at least half a century (Pls. 1-2). A land survey in 1836 described the area as 'sandy, second rate, containing Bur, Black Oak and a few Hickory Trees.' The soils covering the site are Plainfield fine sand (2-6 percent slope, eroded), a Regosol, and Sparta loamy fine sand (0-2 percent slope) a Brunizem. These soils are very sandy, excessively drained, and have an average pH of 6.0. Crop yields are low even under good management.

W. C. McKern estimated the actual areal extent of the site was considerably smaller. A series of nineteen survey pits was dug to establish the limits of the site. This survey indicated that the site covered at least eight and one-half acres and possibly two and one-half additional acres in a general northeast direction. This latter area is stippled on Map 1.

The southern and eastern limits of the site are defined by a steep escarpment. Halfway Creek runs along the bottom of the escarpment on the east and the bottomlands begin at the foot of the escarpment on the south. The field on which the site is situated continues northward for about one hundred and fifty yards. A maze of wind formed sand dunes define the western limit of the site and the northern limit of the field. These dunes are now stabilized and form part of a prairie setting that stretches northward. The site surface is fairly flat, except for a gradual east-west rise reaching a mound-like peak some ten feet above the rest of the site in the northeast corner.

EXCAVATION PROCEDURE

At the time of excavation, the northern three-fifths of the field were planted in alfalfa. Two spacially distinct areas were selected for comparison in the 'village' area and designated Area I and Area II. A burial ground of undetermined size in the extreme southern portion of the site was avoided (Map 1). The site did not reveal any noticeable differences in cultural material as far as could be determined from an analysis of an extensive surface collection.

Three hundred square feet of surface area were excavated in Area I and three hundred and fifty square feet in Area II over a period of six weekends from September through October in 1964. In the excavation of both areas an attempt was made to locate productive features. The plow zone, which was about eight inches thick, was shoveled aside. Arbitrary four and six inch levels were maintained for vertical control within five by five or five by ten foot square units. All

of the soil removed from these levels was screened through a ¼ inch mesh. Marked soil horizons were absent in the undisturbed deposit. The depth of each level from the surface is recorded in Tables 39 and 40.

Table 1. Depth and Surface Extent of Excavated Units

AREA I			AREA II		
unit #	surface extent	depth	unit #	surface extent	depth
1	5' by 10'	3'8"	10	5' by 5'	1'8"
2	5' by 10'	2'8"	11	5' by 5'	empty
3	5' by 10'	2'0"	12	5' by 5'	1'9"
4	5' by 5'	3'0"	13	5' by 5'	2'2"
5	5' by 5'	2'3"	14	5' by 5'	3'9"
6	5' by 5'	2'4"	15	15' by 5'	1'6"
7	5' by 5'	2'6"	16	5' by 5'	1'9"
8	5' by 5'	3'0"	17	5' by 5'	1'7"
9	5' by 5'	3'6"	18	5' by 5'	3'2"
			19	5' by 5'	2'4"
			20	5' by 5'	4'6"
			21	5' by 5'	2'10"

FEATURES

'Refuse' pits were the most common features encountered at the Midway site The word refuse pit is used here to indicate black concentrations of refuse material. These pits were not necessarily self-contained units, for similar materials were found in the lighter colored soil around each feature at all depths. The lack of integrity of these features can be illustrated by the scattered fragments of one jar. Rim sections of this jar, all of which fit together, were found in square 9, Feature 10, at a depth of 17-23" and in the continguous square 8 at levels four (24-30") and five (30-36"). Other sections of the jar were recovered from square 2, level 1 (9-15") and square 20, level 2 (18-24"). Perhaps these refuse pits represent the differential oxidation of scattered organic matter and the consequent reduction of the surrounding soil in areas of high food debris concentration.

No post molds or house trenches were found. A small mussel shell heap (F9), a historic pig burial (F12), and fragments of a disturbed human burial (F13) were the only other features discovered.

All of the refuse pits were roughly basin-like or flat lenticular in vertical outline. The smallest pit (F15) was approximately 13 inches long, 12 inches wide, and 13 inches deep. The largest (F10) measured 48 inches in length, 44 inches in width, and 13 inches in depth. Individual measurements and a short description of each feature are given in Appendix A. A listing of the presence or absence of

mussel shell fragments and the quantities of utilized flakes, unmodified flakes, shell tempered body sherds, and grit tempered sherds found in each test square is given by level in Tables 39 and 40. The remaining relevant data are contained in the descriptive sections.

DATING THE SITE

A Carbon–14 date from a charcoal sample taken from Test square 1, feature 5 (36-40 inches below the surface) gave an age determination of A.D. 1420 ± 70 (WIS–61). A second Carbon–14 date run on a charcoal sample from Test square 20, level 5 (36-42 inches below the surface) gave an age determination of A.D. 1630 ± 60 (WIS–79). Both of these samples were taken from the deepest levels containing adequate amounts of charcoal in each area excavated.

CERAMICS

Methodology

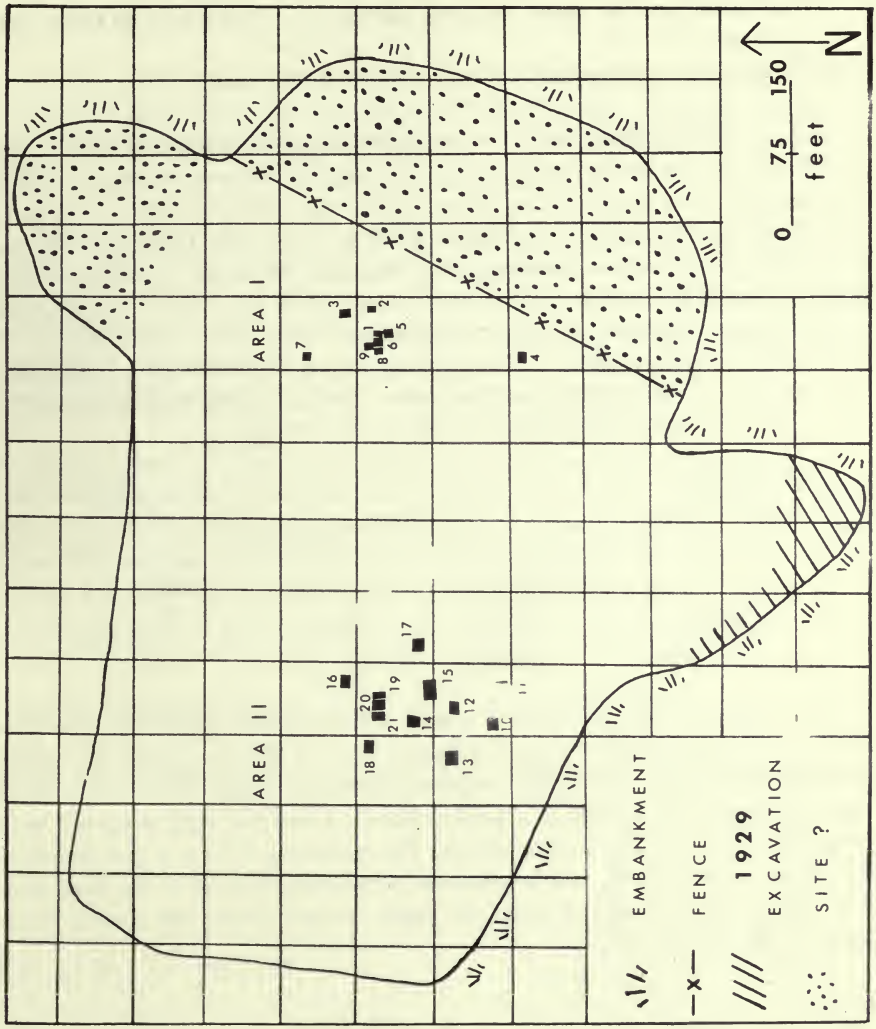
Various methods have been used in the past to describe the pottery found at the Midway site. W. C. McKern utilized a method of descriptive classification that was primarily concerned with elucidating certain fundamental characteristics which differentiated one phase from another (1945:143-152). Standard measurements, such as rim heights or percent of occurrence of design units, were only infrequently mentioned.

Plate 1. View East Across the Midway Site

Plate 2. View of the Mississippi Flood Plain from the Midway Site (looking southwest)

During the years 1959-1961, three reports appeared which introduced the typological concept to the site material. Mildred M. Wedel (1959) and Dale R. Henning (1961) discussed the site ceramics in relation to Allamakee Trailed, a pottery type defined by using material from the Upper Iowa River 'heartland' of the Orr Phase. Both of these reports suggest that the Midway ceramics are similar to Allamakee Trailed, but sufficiently different to warrant possible exclusion from the phase (Wedel, 1959:121; Henning, 1961:35-36). Robert L. Hall (1960), while discussing Mississippian cultures in Wisconsin, indicated that the Midway ceramics might be arranged in a number of types, the main type being Midway Incised. When this report was prepared for publication (1962), Hall included this type, however, within the limits of variation of Allamakee Trailed (Hall, 1962:132).

The methodology used in this report for the purposes of ceramic analysis consists of a blend of the typological method as used by Wedel (1959), Hall (1962), and Henning (1961), and of an attribute analysis. This latter analysis, conducted separately from the typological analysis, serves a twofold purpose: 1) It makes possible a more detailed description of the potentially homogeneous sherds from the two areas excavated and 2) It provides a measurement of the integrity of the pottery types already in use. Grit tempered Woodland sherds and all bowls are excluded from this analysis. The data have been presented as they pertain to each 'area' excavated and then to the site as a single entity. Both the excavated IN SITU material and that recovered from the surface have been



Map 1. The Midway Site

included under the 'site total' columns.

The terminology used in this report to describe vessel form consists of the lip, rim, neck, shoulder area, and body. The following definitions are slightly modified from Henning (1961:11-12).

LIP: Juncture of the inner and outer surfaces
RIM: Section between the lip and neck
NECK: Point of maximum vessel constriction

SHOULDER AREA: Space between the neck and point of maximum body diameter

BODY: Area between the neck and bottom of the vessel

Most of the attributes used in this report are non-continuous stylistic variables. Several continuous variables (e.g. rim height) have been included, because they appear to be important in distinguishing the 'Iowa Orr phase' sites from the 'Wisconsin Orr phase' sites (Wedel, 1959:114-115, 131; Henning, 1961:35-36). Other continuous variables such as thickness, hardness, or color are considered separately, as are surface finish and temper, which are homogeneous for the sample. Information concerning general vessel shape, vessel height, orifice diameter, and number of attached appendages is included as a supplementary part of the following general discussion. Because of the fragmented nature of the sample, these latter attributes are rarely measureable.

Sample

The ceramic analysis is based upon the following sample:

	bodysherds	rim sherds	handles
Area I	1639	63	12
Area II	1431	70	9
Site Total	3283	143	21

No complete or nearly complete vessels were recovered. Therefore, inferences as to the characteristics of complete vessels must be based on large rim sections and bodysherds. Each rim sherd probably represents a single vessel. The pottery recovered from Areas I and II is predominantly a uniform shell tempered ware which accounts for 98.3% of all sherds. The remaining 1.7% is a grit tempered Woodland pottery which will be discussed separately. Because of the basic similarity of the shell tempered ware, the paste, surface finish, and general vessel form are discussed together.

Paste

Temper: Temper consists of moderate to abundant amounts of crushed shell with few pieces exceeding 3 mm. in length. Most of the shell particles are aligned parallel to the vessel surface. On many sherds the shell has leached away leaving irregular pits or holes on the surface. Occasionally a small amount of grit is included in the paste.

Texture: The consistency of the pottery ranges from compact to a more frequent flakiness. The fracture of a sherd reveals a laminated cross section.

Hardness: Most of the sherds measure 2–3.5 in mineral hardness on Moh's scale. A few sherds range as high as 4. When decorated these latter sherds display

a greater neatness in design execution.

Color: Interior surfaces are generally grayer than the exterior colors, which range from dull orange to gray and dull brown to black. Many bodysherds are smoke blackened and some occasionally have a flaky black residue on the inner surface.

Surface Finish: The surfaces of all sherds are smooth and dull. No polish or glaze occurs on the ceramics. A red film or powder is found on 7 of the plain bodysherds (5 from Area I, 2 from Area II) and on 5 decorated shoulder sherds (all from Area I). Evidence of scraping by a bundle of grass or similar object frequently appears on both surfaces of the rim and on the interior surface of bodysherds. Smoothing was usually carelessly executed.

Vessel Form: As far as was ascertainable from the fragments of vessels available, the predominant vessel form is globular or ellipsoidal with rounded rather than flat or conoidal bases. The shoulder area thins rapidly from the juncture with the neck and ascribes an arc with the remainder of the vessel wall. No sherds were found which would indicate an angular rather than curved shoulder. The following table indicates the frequency in percent of the thickness of plain bodysherds as estimated from a sample of each area.

Table 2. Bodysherd Thickness

Max. Thickness in mm.	Area I	Area II	Site Frequency
3 to 4	0.5	9.0	5.0
4 through 5	57.5	62.0	59.0
6 " 7	36.0	24.0	30.0
8 " 9	5.0	5.0	5.0
10 " 11	1.0	0.0	1.0
	100.0	100.0	100.0

Lip Diameter and Vessel Capacity

The nature of the sample precludes any exact measurement of vessel sizes. Lip diameters probably range from 5–10 cm. on small jars and up to at least 45 cm. on larger vessels. The great majority of jars are scattered between 20–35 cm., with a marked clustering around 30 cm. Estimates of lip diameters are given in Table 19–20. Vessel capacity ranges from small jars capable of containing somewhat more than a pint up to vessels with a 5–8 gallon capacity. No

estimates of vessel heights were attempted.

Attributes

Class I: Lip Profile

All lips can be separated into a rounded or a flattened grouping (rounded: Pl. 4, A and B; flattened: Pl. 4, C2 and C3). The lip was usually thinned and rounded before the application of decoration. Lip thickness varies from 4–11 mm., with 6–7 mm. the most frequent measurement. The thickest lips are associated with flattened lip surfaces. Attribute associations for all classes are listed in Tables 19–20.

Table 3. Lip Profile

	Area I		Area II		Site Total	
profile	no.	%	no.	%	no.	%
1. rounded	46	90.2	66	94.3	125	93.3
2. flattened	5	9.8	4	5.7	9	6.7
totals	51	100.0	70	100.0	134	100.0

Class II: Lip Decoration Technique

There are three techniques of lip decoration in the sample: tool-impressing (Pl. 3, nos. 2, 6, 7), fingertip punctating (Pl, 3, nos. 1, 4), finger or broad tool-impressing (Pl. 3, nos. 3, 5). The latter group consists almost entirely of 'scallops' and 'long ellipses' (discussed in Class III).

The term 'tool-impressed' refers to the impression produced by placing an object other than part of the body parallel to or at an angle to the lip or vessel surface and pressing downward. The term 'punctate' refers to the marks produced by pushing a tool or fingertip vertically into the vessel surface. Fingertip punctate is characterized by the presence of a fingernail imprint in the punctation.

Class III: Lip Design Elements

This class is composed of 7 basic designs. Plate 3 illustrates the design elements with their corresponding code numbers. Because this grouping depends in part on method of execution, a brief explanation of each attribute is given below.

1. simple fingertip punctates–consecutive shallow fingertip punctations, usually round, which seldom alter the entire lip surface. Punctations range from 4–6 mm. in diameter and are generally 5 mm. apart. The depth seldom exceeds 1 mm. and never 2 mm.

2. oblique tool–impressions–consecutive tool-impressions, always elliptical,

Table 4. Lip Decoration Technique

		Area I		Area II		Site Total	
	technique	no.	%	no.	%	no.	%
1.	tool-impressed	15	30.0	11	16.9	28	21.5
2.	fingertip punctate	2	4.0	2	3.1	4	3.1
3.	finger or broad tool-impressed	19	38.0	22	33.8	47	36.2
4.	plain	14	28.0	30	46.2	51	39.2
	totals	50	100.0	65	100.0	130	100.0

that cross the lip at an approximate 45° angle. The width of the impressions and the distance between them is 2–5 mm. The impression length ranges from 3–9 mm. and the depth seldom exceeds 3 mm.

3. scallops–flattened impressions 15–20 mm. long, which are either continuous or consistently about 5 mm. apart. They appear to have been made by pressing a finger onto the lip surface.

4. deep fingertip punctates-essentially the same as 1 above except the punctations are larger and deeper–ranging from 3–7 mm. in depth. The punctates alter the entire lip.

5. long ellipses–similar to 3 above except the impressions are about 35 mm. in length.

6. transverse tool–impressions–essentially the same as 2 above except the impressions cross the lip at an approximate 90° angle.

7. inner lip tool–impressions–consecutive elliptical tool-impressions contained within the lip surface. Impressions range from 7–11 mm. in length and 2–3 mm. in width.

Class IV: Rim Profile

Rim sections large enough to display a complete profile were grouped under 9 headings. Examples of each group are illustrated in Plates 4 and 5. The criteria used in establishing these categories were height, thickness, and basic configuration. Groups A–C are of the same approximate height; A, however, consists of rims with angular necks, while the neck sections of B and C are curved. Groups B and C are separated by the greater thickness of both the rim and the lip of specimens in the latter group. Rim heights in D and E are shorter, than in the above groups. The relative thinness of the rims in E, in addition to the less pronounced curvature of their necks, separate this group from the rims in D. Groups F–I are composed of forms differing markedly from the other groups as well as

Table 5. Lip Design Elements

	Area I		Area II		Site Total	
design	no.	%	no.	%	no.	%
1	2	5.6	3	8.6	6	7.6
2	12	33.3	5	14.3	18	22.8
3	16	44.4	12	34.3	31	39.2
4	1	2.8	1	2.9	2	2.5
5	3	8.3	10	28.6	15	19.0
6	1	2.8	1	2.9	2	2.5
7	1	2.8	3	8.6	5	6.3
totals	36	100.0	35	100.0	79	99.0

from each other.

Vessel rims generally taper from the neck to the lip. Rims uniform in thickness are in the minority. The shapes of the rim body vary from straight to outcurving. Rim thickness varies from 5–12 mm. in both Areas I and II. The most frequent measurement is about 8 mm.

Table 6. Rim Profiles

	Area I		Area II		Site Total	
profile	no.	%	no.	%	no.	%
A	10	33.3	6	20.7	16	25.0
B	7	23.3	4	13.8	12	18.8
C	2	6.7	6	20.7	8	12.5
D	4	13.3	4	13.8	9	14.1
E	3	10.0	2	6.9	7	10.9
F	2	6.7	3	10.3	6	9.4
G	1	3.3	0	0.0	1	1.6
H	1	3.3	3	10.3	4	6.3
I	0	0.0	1	3.4	1	1.6
totals	30	99.0	29	99.0	64	100.0

Class V: Rim Height

The boundaries used in this class are those suggested by Wedel (1959:85). Measurements were taken from the lip to the neck interior. Rim height ranges from 13–52 mm. The mean rim height is 36 mm. in Area I and 35 mm. in Area II. In general high rims appear to be associated with relatively large vessels. The actual height of each rim is listed in Tables 19 and 20.

Table 7. Rim Heights

		Area I		Area II		Site Total	
	height	no.	%	no.	%	no.	%
1.	10 to 19 mm.	0	0.0	1	3.1	1	1.4
2.	20 to 29 mm.	6	20.7	9	28.1	18	26.1
3.	30 to 39 mm.	9	31.0	10	31.3	20	29.0
4.	40 to 49 mm.	14	48.3	11	34.4	29	42.0
5.	50 to 59 mm.	0	0.0	1	3.1	1	1.4
	totals	29	100.0	32	100.0	69	99.9

Class VI: Inner Rim Upper Edge Design Technique

The decorative techniques used on the upper edge of the inner rim are the same as those used in Class II, i.e. tool-impressing (Pl. 6, nos. 1–2), fingertip punctating (Pl. 6, 3B), and finger or broad tool-impressing (Pl. 6, 3A).

Table 8. Inner Rim, Upper Edge Design Techniques

	Area I		Area II		Site Total	
technique	no.	%	no.	%	no.	%
1	4	8.7	20	34.5	27	23.1
2	8	17.4	3	5.2	11	9.4
3	2	4.3	8	13.8	14	12.0
plain	32	69.6	27	46.5	65	55.6
totals	46	100.0	58	100.0	117	100.1

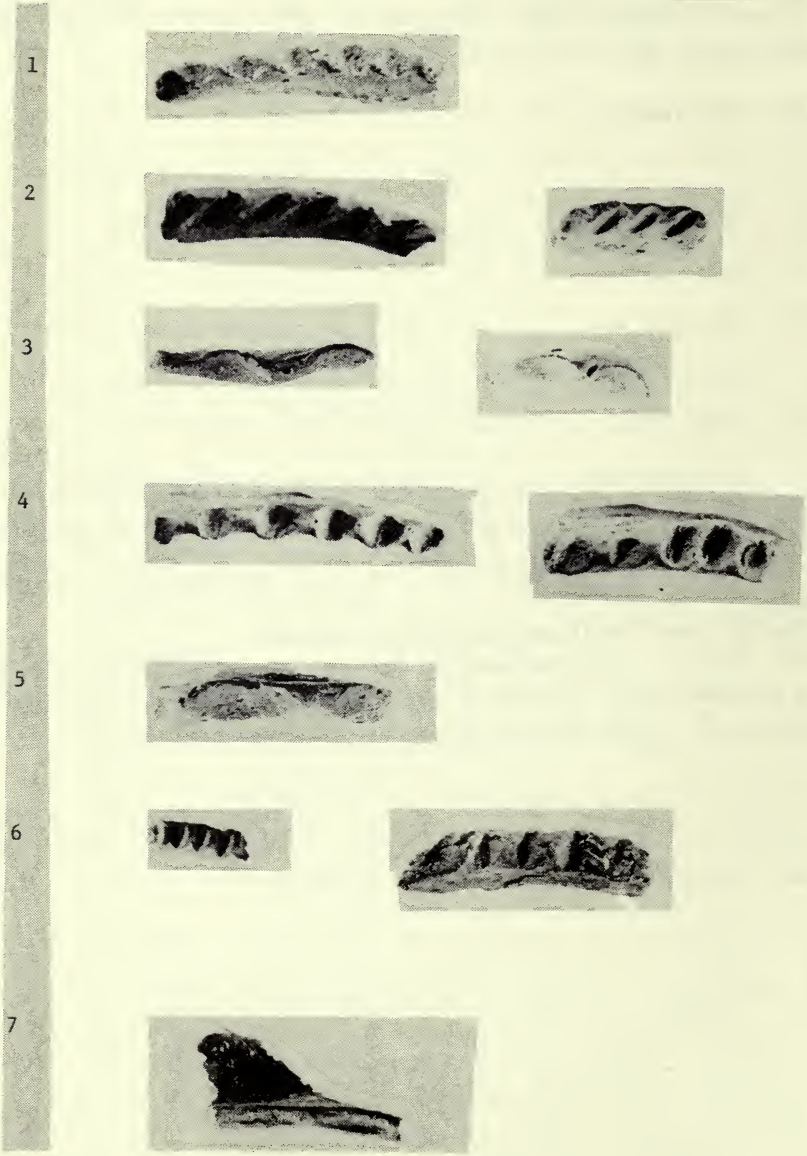

1
2
3
4
5
6
7

Plate 4. Rim Profiles: A–C (interior surface at left)

Plate 5. Rim Profiles: D–I (interior surface at left)

Class VII: Inner Rim Upper Edge Design Elements

Three basic designs are found on the upper edge of the inner rim. They are (Pl. 6):

1. long, oblique tool-impressions
2. long, vertical finger or broad tool-impressions
3. round, vertical fingertip impressions

Table 9. Inner Rim, Upper Edge Design Elements

designs	Area I no.	Area I %	Area II no.	Area II %	Site Total no.	Site Total %
1.	3	21.4	17	54.8	24	46.2
2	2	14.3	5	16.1	7	13.5
3	9	64.3	9	29.0	21	40.4
totals	14	100.0	31	99.9	52	100.1

Class VIII: Angle of Rim to Body

Angular divergence between the rim and a vertical line drawn through the perimeter of the vessel orifice ranges from 10–45 degrees, with 30 degrees the most frequent angle encountered. No vertical rims are present in the sample. All of the rims, with one exception (Pl. 5, G), slant away from the vessel interior.

Table 10. Angle of Rim to Body

	angle	Area I no.	Area I %	Area II no.	Area II %	Site Total no.	Site Total %
1.	inslant	1	2.3	0	0.0	1	1.2
2.	outslant	42	97.7	33	100.0	83	98.8
	totals	43	100.0	33	100.0	84	100.0

Class IX: Shoulder–Neck Angle

Rim sections retaining an attached portion of the shoulder were segregated into one of two groupings depending on whether the juncture of the rim and shoulder was curved or angular. Rim profiles in Pl. 4, A, for example, consist entirely of rims exhibiting an angular juncture, whole grouping B is composed of rims with a curved juncture.

Table 11. Shoulder–Neck Angles

	angle	Area I no.	Area I %	Area II no.	Area II %	Site Total no.	Site Total %
1.	angular	15	34.1	11	32.4	28	32.6
2.	curved	29	65.9	23	67.6	58	67.4
	totals	44	100.0	34	100.0	86	100.0

Class X: Shoulder Decoration Technique

Eleven decorative techniques and combinations of techniques are present on shoulders with rim sherds attached. These attributes are segregated in part by the establishment of arbitrary boundaries defining widths of lines and in part by the method of execution. The arbitrary boundaries used are those suggested by Wedel (1959:131). A brief explanation of each attribute is given below.

1. fine line, trailed (P 1.7) – trailed lines, about 1 - 2.5 mm. wide and quite shallow. Trailing in this report refers to lines formed by pulling a tool or a finger across the vessel surface while the clay is still damp (Wedel, 1959:88-89; Henning 1961:12). All of the trailed lines in attribute 1 were produced by the use of a tool. Incised lines, herein interpreted as formed by cutting across the dry surface of a fired vessel, are not present in the sample.

2. medium line, trailed–trailed lines produced by a tool, about 2.5–4.5 mm. wide and deeper than 1 above.

3. wide line, trailed (P1. 8)–trailed lines produced by a tool, about 4.5–8 mm. wide and ranging from 1–4 mm. in depth.

4. finger trailed (P1. 9)–trailed lines produced by the use of a finger, about 10–14 mm. wide. The countour of the lines appears on the inner surface of the shoulder.

5. fine line, trailed and tool-impressed (P1. 9)–a combination of 1 above and 10 below.

6. medium line, trailed and tool-impressed (P1. 9)–a combination of 2 above and 10 below.

7. wide line, trailed and tool-impressed–a combination of 3 above and 10 be-

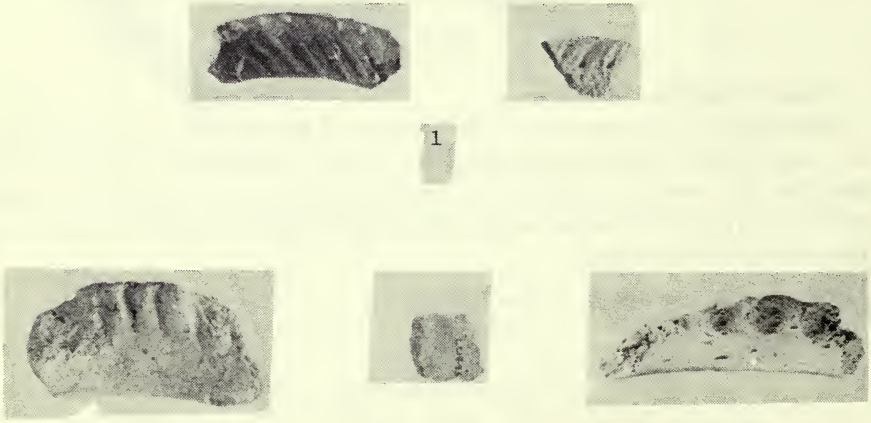


Plate 6. Rim Design Elements (2/3 natural size)

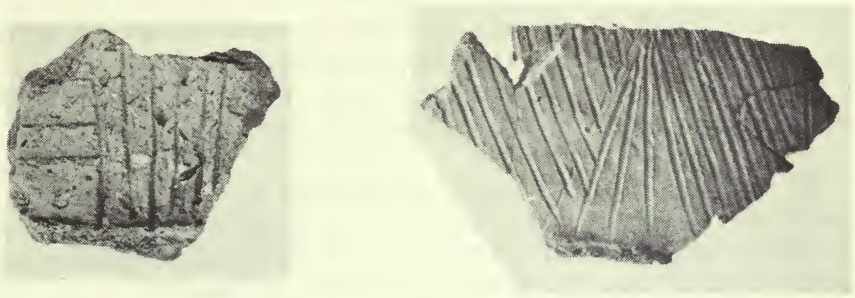


Plate 7. Shoulder Decoration Technique: 1-fine line, trailed (3/4 natural size)

low.

8. finger trailed and tool-impressed (Pl. 10)—a combination of 4 above and 10 below.

9. fine line, trailed and punctate (Pl. 10)—a combination of 1 above and 11 below.

Table 12. Shoulder Decoration Technique Attributes

	Area I		Area II		Site Total	
technique	no.	%	no.	%	no.	%
1	56	3.50	51	3.60	133	4.00
2	141	8.70	74	5.20	225	6.20
3	55	3.40	28	2.00	88	2.70
4	13	0.80	5	0.40	19	0.60
5	4	0.20	4	0.30	9	0.30
6	12	0.70	3	0.20	15	0.50
7	2	0.10	1	0.07	3	0.10
8	0	0.00	1	0.07	1	0.03
9	0	0.00	1	0.07	2	0.06
10	2	0.10	3	0.20	6	0.20
11	1	0.06	2	0.10	3	0.10
plain	1327	82.30	1245	87.80	2815	84.50
totals	1613	99.86	1418	100.01	3319	99.29

10. tool-impressed (Pl. 10)—one side of the impression is usually deeper than the other. If the angle is acute, a 'tear drop' effect is produced.
11. punctate (Pl. 10)—the characteristic shape is round. Punctations at the Midway site are usually smaller than tool-impressions.

All vessel shoulders in the sample are decorated. Most of the decoration is poorly executed. A number of attributes, i.e. 5–8 and 10–11, only occur on shoulder sections detached from their rims. The following table indicates area and site totals for these 11 attributes on all sherds.

Class XI: Shoulder Design Elements

Design elements consist of units of straight trailed lines, punctations, tool-impressions, or of a combination of these decorative techniques. Dashes and curvilinear lines are absent. The eleven basic design elements are illustrated in Figure 1 and in Plates 11 and 12. Tables 39-40 record associations between shoulder decoration techniques (Class X) and shoulder design elements (Class XI). Attribute associations for shoulders with attached rims are listed in Tables 18-20.

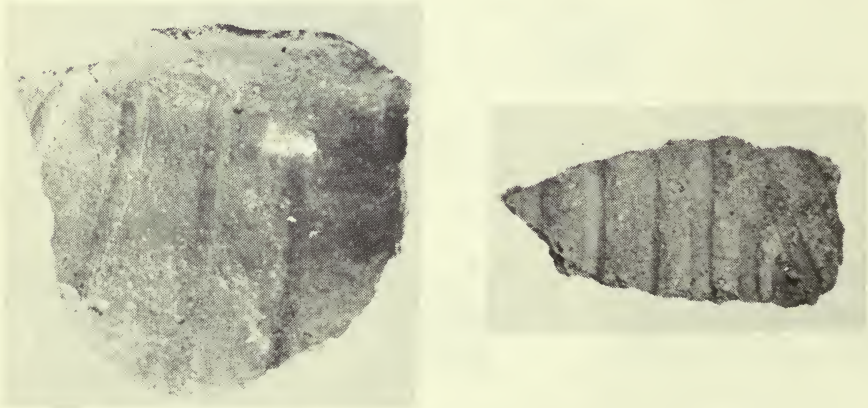


Plate 8. Shoulder Decoration Technique: 3—wide line, trailed (1/2 natural size)

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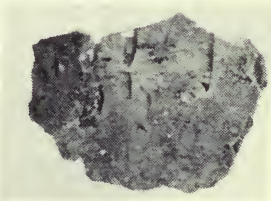

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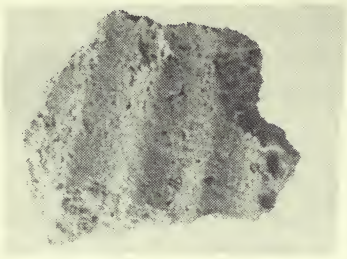
Plate 9. Shoulder Decoration Technique: 4—finger, trailed; 5—fine lined, trailed and tool-impressed; 6—medium lined, trailed and tool-impressed (1/2 natural size)



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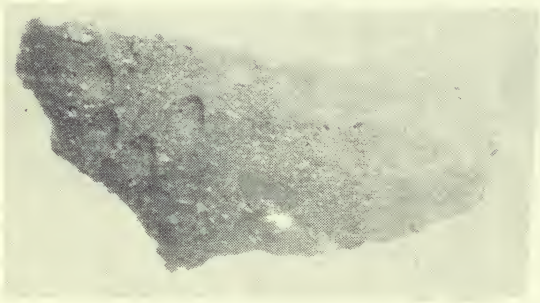

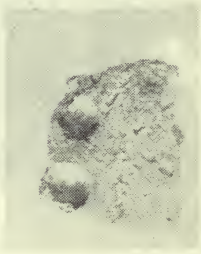

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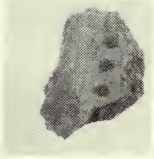

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Plate 10. Shoulder Decoration Technique: 8—finger, trailed and tool-impressed; 9—fine line, trailed and punctate; 10—tool-impressed; 11—punctate. (1/2 natural size)

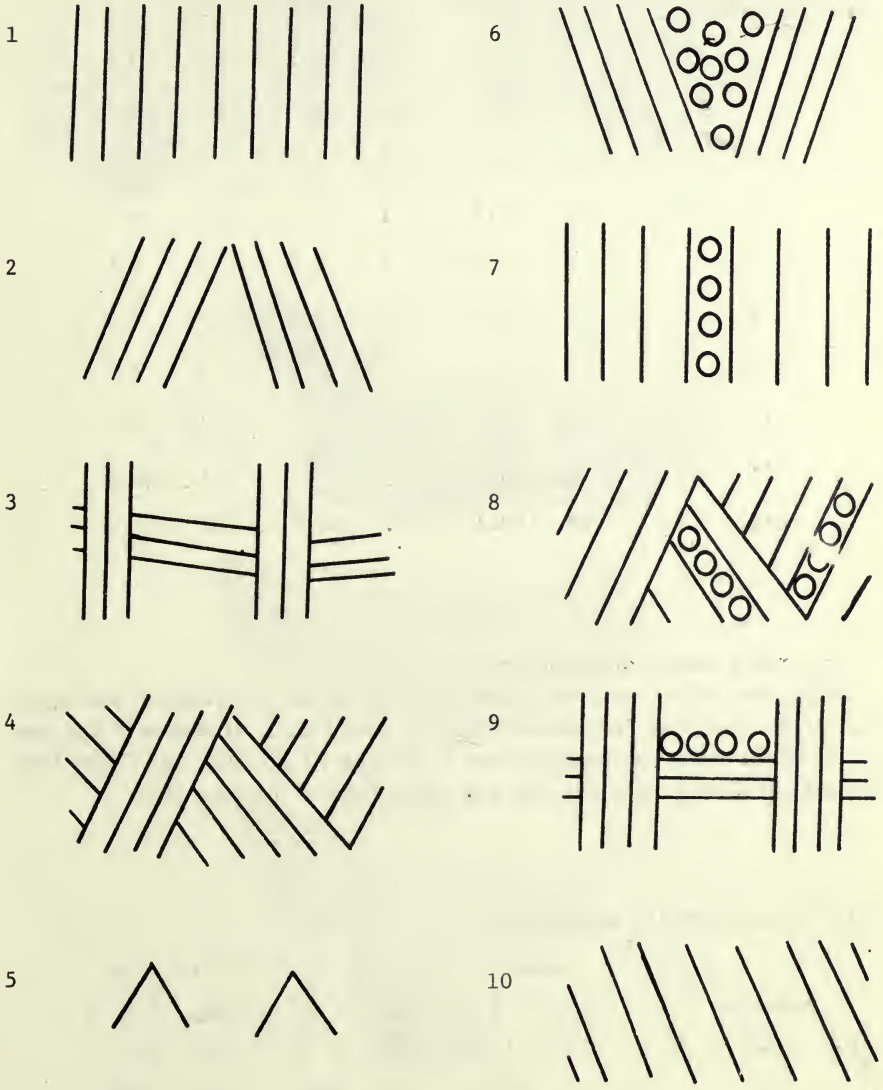

Figure 1. Shoulder Design Elements

Table 13. Shoulder Design Elements

	Area I		Area II		Site Total	
design	no.	%	no.	%	no.	%
1	15	25.4	6	19.4	23	25.0
2	0	0.0	2	6.5	2	2.2
3	5	8.5	5	16.1	10	10.9
4	29	49.2	14	45.2	43	46.7
5	1	1.7	0	0.0	1	1.1
6	3	5.1	1	3.2	4	4.3
7	0	0.0	1	3.2	1	1.1
8	3	5.1	0	0.0	3	3.2
9	2	3.4	0	0.0	2	2.2
10	1	1.7	1	3.2	2	2.2
11	0	0.0	1	3.2	1	1.1
totals	59	100.1	31	100.0	92	100.0

Class XII: Location of Decoration

Decoration occurs on 3 main areas of the vessels: lip, shoulder, and upper edge of the inner rim. No undecorated pots were found. Attributes in this class consist of the following combinations: 1. Shoulder; 2. Shoulder and Upper Edge of the Inner Rim; 3. Shoulder, Lip, and Upper Edge of the Inner Rim.

Table 14. Location of Decoration

	Area I		Area II		Site Total	
location	no.	%	no.	%	no.	%
1	13	81.3	7	41.2	19	61.3
2	3	18.8	9	52.9	11	35.5
3	0	0.0	1		1	3.2
totals	16	100.0	17	100.0	31	100.0

Plate 11. Shoulder Design Elements: 1 (A—no. 34 in Table 19, B—no. 54 in Table 19), 2 (no. 11 in Table 20), 3 (no. 57 in Table 19), 4 (no. 56 in Table 19) (1/2 natural size)

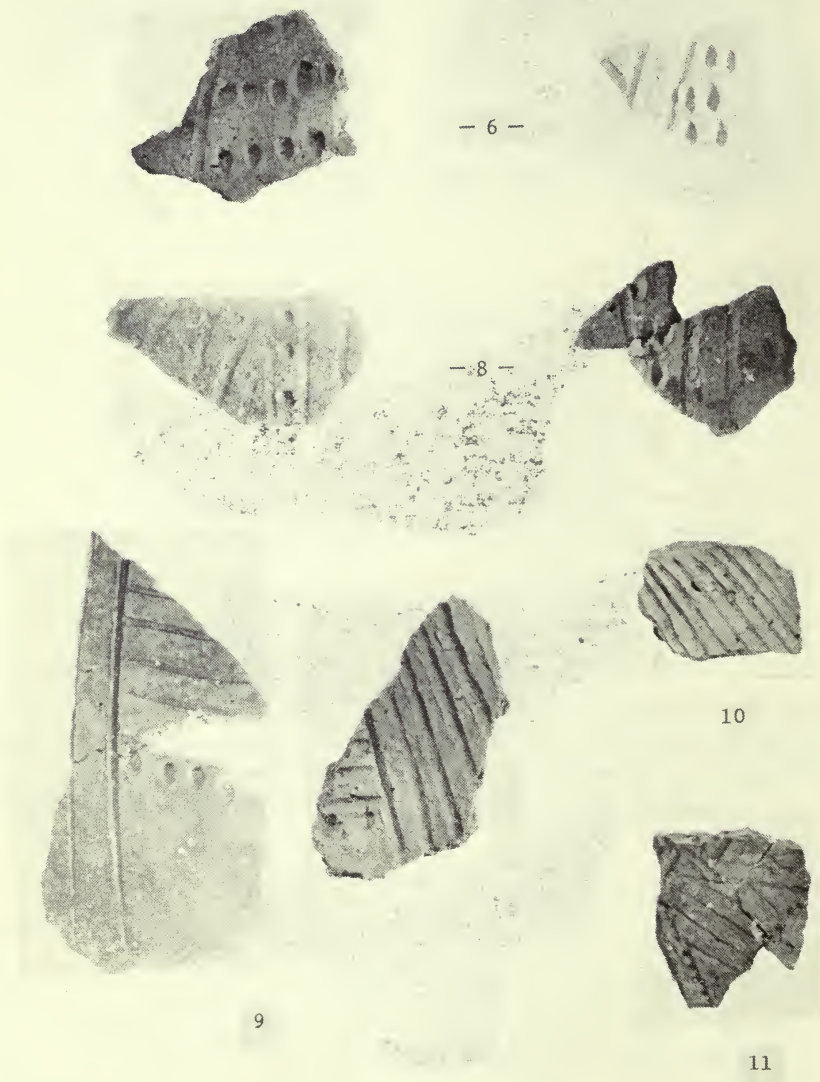

Plate 12. Shoulder Design Elements: 6, 8, 9, 10, 11. (3/4 natural size)

Class XIII: Appendages

This class is composed of 7 attributes defined by shape, method of attachment, and location of attachment (Pl. 14). The attributes are:

1. equilateral strap handle, welded to body and lip
2. flaring strap handle, welded to body and lip
3. equilateral strap handle, welded to body and rim below lip
4. detached equilateral strap handle
5. detached flaring strap handle
6. loop handle, welded to body and lip
7. detached loop handle

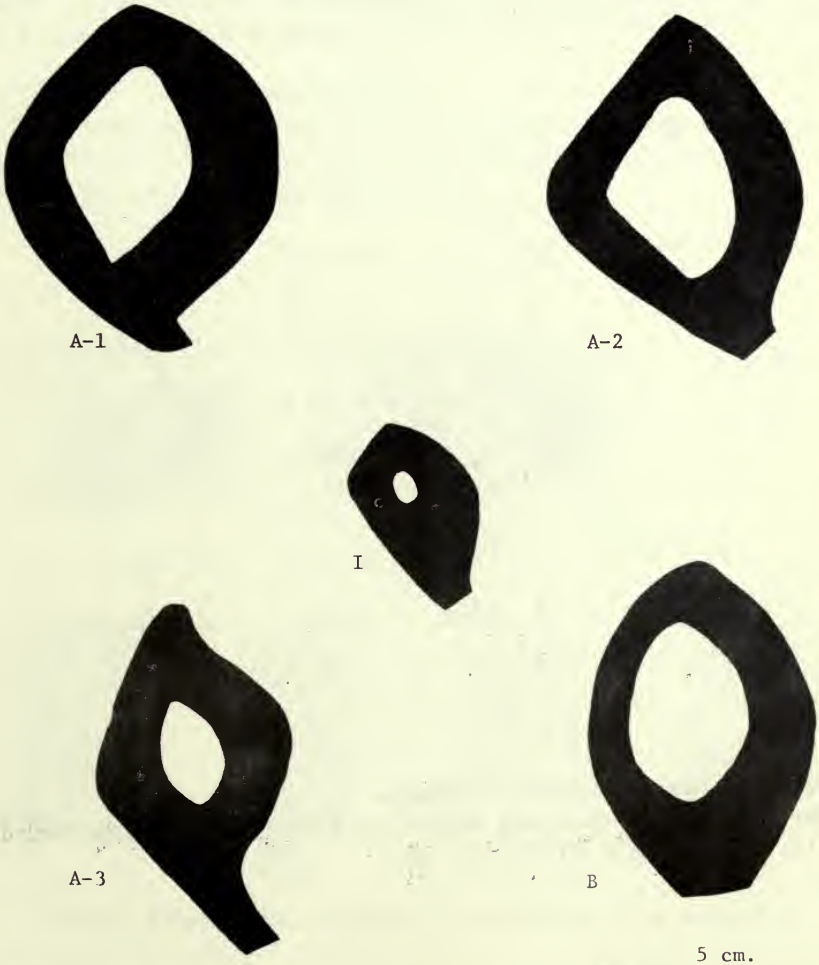

Plate 13. Handle Profiles.

(Letters indicate rim type in Class IV. A-1, A-3, B, and I are nos. 28, 67, 66, and 8 in Table 20. A-2 is no. 15 in Table 19. Interior surfaces are at left.)

Two basic types of handles are represented in this class: strap and loop. These were the only kinds of vessel appendages found. Loop handles are approximately round in cross section and range from 9–14 mm. in diameter. The mean diameter is 11 mm. The width of strap handles is usually constant along their lengths, ranging from 22–44 mm. for the different handles. The average width is 30 mm. and the average thickness is 11 mm. Most of these handles flare from 2–5 mm. Three handles flare markedly and are placed in a separate grouping. The difference between the width of the body of these handles and the end attached to the rim ranges from 11–17 mm.

The number of handles attached to a vessel is probably 2. No rims were found which would indicate that four handled vessels were used at the site. Some handled vessels were used at the site. Some handle profiles are illustrated in Plate 13.

Table 15. Appendages

	Area I		Area II		Site Total	
appendages	no.	%	no.	%	no.	%
1	3	25.0	0	0.0	3	14.3
2	0	0.0	2	22.2	2	9.5
3	0	0.0	3	33.3	3	14.3
4	6	50.0	1	11.1	7	33.3
5	1	8.3	0	0.0	1	4.8
6	0	0.0	2	22.2	2	9.5
7	2	16.7	1	11.1	3	14.3
totals	12	100.0	9	99.9	21	100.0

Class XIV: Handle Decoration Technique

Two techniques of decorating handles are present in the sample: trailed (Pl. 15, 1–3) and grooved (Pl. 15, 4).

Table 16. Handle Decoration Technique

		Area I		Area II		Site Total	
	technique	no.	%	no.	%	no.	%
1.	trailed	3	25.0	3	37.5	6	30.0
2.	grooved	2	16.7	0	0.0	2	10.0
3.	plain	7	58.3	5	62.5	12	60.0
	totals	12	100.0	8	100.0	20	100.0

Class XV: Handle Design Elements

Four basic designs are found on the handles (Pl. 15): 1—two vertical trailed lines; 2—three vertical trailed lines; 3—parallel diagonal trailed lines from upper left to lower right; 4—a single vertical groove.

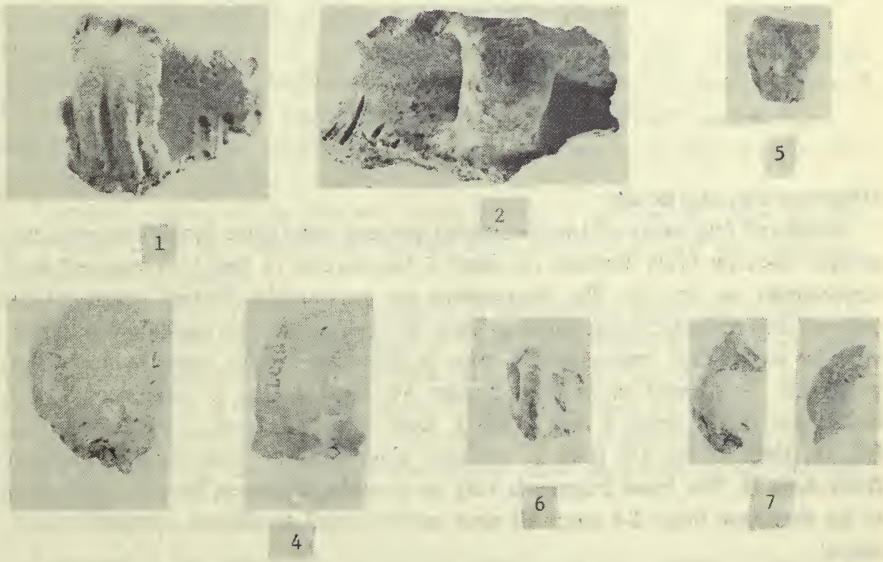

Plate 14. Appendages (1 and 2 are 1/2 natural size; 4-7 are natural size)

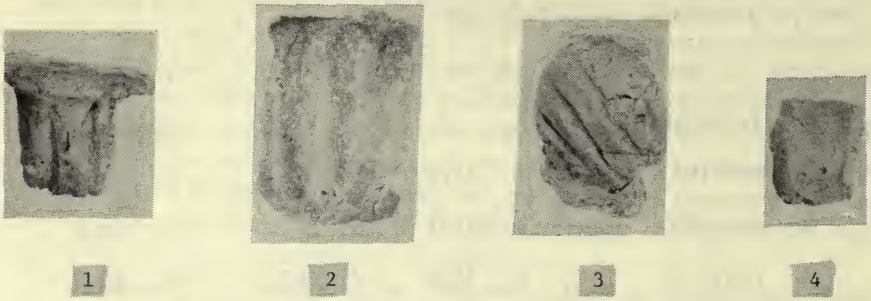

Plate 15. Handle Design Elements (4/5 natural size)

Table 17. Handle Design Elements

	Area I		Area II		Site Total	
designs	no.	%	no.	%	no.	%
1	0	0.0	2	66.7	2	25.0
2	2	40.0	1	33.3	3	37.5
3	1	20.0	0	0.0	1	12.5
4	2	40.0	0	0.0	2	25.0
totals	5	100.0	3	100.0	8	100.0

Miniature Jars and Bowls

Rimsherd fragments of two decorated jars and eight plain bowls comprise the sample. One jar from Feature 10, level 2, has narrow (1 mm.) interrupted tool impressions on the lip. The impressions are grouped in clusters separated by smooth and rounded lip sections at least 20 mm. apart. The second jar has consecutive ovoid tool impressions 5 mm. in diameter on the upper edge of the inner rim. This sherd came from Square 19, level 2. The proveniences of the bowls are: Sq. 1, levels 1 and 3; Sq. 2, level 1; Sq. 13, level 2; Sq. 14, level 2; Sq. 16, level 2; Sq. 19, level 2; Surface. Three rims are from Area I and four from Area II. The bowl fragments vary in shoulder thickness from 2-7 mm. and in lip thickness from 2-4 mm. All rims are too small to discern complete vessel shape.

Pottery Types

All but two of the shell tempered 'vessels' in the sample fall within the range of the proposed type ALLAMAKEE TRAILED (Wedel, 1959: 91-92; Henning, 1961:28-29). Alternatively, a perusal of Hall's thesis (1960) and published re-

port (1962) suggests that the sample can be divided into three main types: ALLAMAKEE TRAILED, RED BANKS PUNCTATE, KOSHKONONG BOLD. The latter type includes those sherds having finger trailing as a shoulder decoration technique (Class X, no. 4) in a parallel vertical line design element (Class XI, no. 1). RED BANKS PUNCTATE includes those sherds with "areas of punctates (tool-impressions in this report) between plats of vertical lines or in triangular spaces between converging sets of diagonal lines" (Hall, 1960:177) (Class XI, no. 6). The remainder of the sherds with two possible exceptions would fall within the range of ALLAMAKEE TRAILED. The two divergent sherds are an inslanting rim (Pl. 5, G; no. 34 in Table 18) and a shoulder fragment with an unusual design element (Pl. 12, no. 11; Class XI, no. 11).

Both Midway site samples are distinct from the Upper Iowa River Orr Phase ceramics by the preponderance of certain attributes and the presence or absence of others. The more important differences, most of which were noted by Wedel and Henning, are listed below.

1. lips—The Midway samples contain a greater proportion of undecorated lips associated with decorations on the upper edge of the inner rim. A 'common' Upper Iowa River lip decoration technique of tiny impressions made in the lip surface is absent. Except for one miniature pot, interrupted tool-impressions are not found on the lips of Midway jars.

2. rims—The majority of the impressions on the upper edge of the inner rim of Midway jars are not straight but slant left or right. Vertical rim profiles and undecorated rim sherds (including the lip) are not present in the Midway samples. The mean rim heights of the Midway samples are 6 mm. shorter, than the means given for Upper Iowa River jars.

3. handles—Many of the Midway vessels appear to lack handles. Most handles are welded to the lip. Neither the 'turkey foot' design, nor clay 'crests' are present on Midway handles.

4. shoulder area—There is no evidence in the samples from the Midway site of the use of dashes, parallel zigzag lines, circles, or curvilinear lines of any kind in the composition of the shoulder area design elements. Most trailed lines are 3-4 mm. in width. A more intensive decoration is effected on Midway ceramics by the use of broader lines placed closer together. Tool-impressions are used to border trailed lines. There are no undecorated vessel shoulders among the Midway samples.

A perusal of the archaeological reports mentioning the material recovered by McKern in 1929 indicate that the full range of variation for the site is not available in the two samples discussed here. Griffin (1943) mentions a few sherds containing a grooved paddle surface finish (p. 288), and illustrates the use of circular decorations in a shoulder design element (Pa. CXLI, fig. 22), the use of tool-impressions to decorate the outer rim (Pl. CXLII, fig. 2), and the presence

of the notched loop handle (Pl. CXLII, fig. 5). McKern (1945) illustrates the use of horizontal trailed lines on the exterior surface of a vertical rim possessing a small loop handle welded onto its surface (Pl. 55, fig. 8), and a 'cambered' rim (Pl. 55, fig. 2; Pl. 70, fig. 2). He also mentions the recovery of an imperforate pottery disc (p. 138).

Grit Tempered Pottery

Grit tempered sherds account for only 1.7% of the pottery from the site. All sherds are too small to determine design motifs or vessel shapes. The grit tempered pottery displays a preponderance of cord-marking, possibly of a cord-wrapped paddle variety. Of the cord-marked sherds, 82% have impressions from a s_Z^Z cord with a R_1^1 twist and 18% have impressions from a z_S^S cord with a L_r^r twist. Percentages for Areas I and II are 76.5 and 81.5 for the latter grouping and 23.5 and 18.5 for the former.

Table 18 lists the frequency of the sherds of the above two groups and all of the remaining grit tempered sherds according to decoration technique. The fabric impressions were the result of a simple under-and-over weave pattern (i.e. 'plain' weave) applied to the vessel surface. The individual strands in the weave are z_S^S with a L_r^r twist. Trailed lines in the 'Plain' categories are from 1-2 mm. in width. The parallel oblique rows (20 to the right from a vertical position) on the rim sherd with straight dentate stamped impressions are 17 mm. long and 4 mm. wide. Each rectangular dentate is 4 mm. long, 1.5 mm. wide, and about 1 mm. in depth. The lip of this rim is undecorated and flat (Pl. 16, A). A second rim fragment (Sq. 9, Feature 10) is cord roughened on both surfaces and has two horizontal rows of wedge-shaped punctations separated by a band of 5 parallel horizontal incised lines on the exterior surface of the rim (Pl. 16, B). The lip is decorated by V-shaped notches cut into the lip after it had dried. Letters in the second column for cord-marked sherds refer to single specimens in each group. A plain sherd with trailed lines and punctates is illustrated in Plate 16, C.

Although the rim sherds are small, enough attributes exist on three rims to warrant their tentative placement into types. These types are: 1) HAVANNA TRADITION, NAPLES STAMPED, VARIETY DENTATE (Griffin, 1952:110-112) (Sq. 4, 8-36" below the surface; A in Pl. 16); 2) ANGELO PUNCTATE (William M. Hurley, personal communication) (Sq. 9, Feature 10, 16-20" below the surface; B in Pl. 16); 3) MADISON CORD IMPRESSED, VARIETY Z (Baerreis, 1953:12-15; William M. Hurley, personal communication) (Sq. 12, 9-15" below the surface; letter C in Table 16). The placement of these three rims into types must remain suspect due to the small size of the sherds and the limited number of observable attributes. Rims on these sherds are flat.

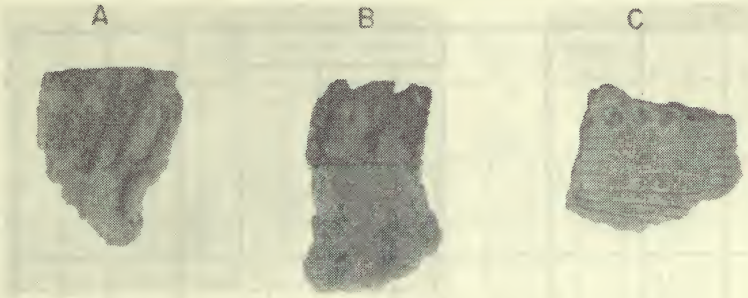

Plate 16. Grit Tempered Sherds

Miscellaneous Clay Object and Secondary Modification

A small piece (15x10x6 mm.) of untempered, fired clay was found in Square 20, level 2. Secondary modification occurs on a small shell tempered body sherd in the form of a hole 5 mm. in diameter drilled from the exterior surface. This sherd from Square 12, level 1 is decorated with trailed lines 3–4 mm. in width.

CHIPPED STONE ARTIFACTS

Scrapers

Scrapers were by far the most abundant stone artifact found at the Midway site. Seventy-seven end scrapers were found IN SITU, for example, as compared to eighteen projectile points. Scrapers are separated into end and side categories depending on the placement of the main scraping edge.

End Scrapers

End scrapers are sorted into six groups depending in part on material composition and in part on the presence or absence of selected attributes such as bulb of percussion, unmodified striking platform, or a ventral surface with a single flake scar. Each of these groups, with one exception, is separated into two sub-groups depending on whether the proximal end of the tool (the 'hafting' end) is (A) less than half the maximum implement width or (B) more than half the maximum width. Additional data, such as length, extent of secondary retouching, and color are included in Tables 22-25. Also included in the tables is a column labeled "Cross section," which indicates if (A) the maximum thickness adjoins the scraping or distal edge with the dorsal surface sloping toward the proximal end, or (B) the thickness is uniform over at least half the scraper length and the dorsal surface is flat or longitudinally ridged, or (C) the surface of the tool is highly irregular. Other symbols used are: –no secondary retouch, + sec-

Table 18. Grit Tempered Pottery Decoration Techniques

Square	Level or Feature	Depth in inches from Surface	cord $\begin{smallmatrix} & z \\ s & \\ & z \end{smallmatrix}$ twist $\begin{smallmatrix} & l \\ R & \\ & l \end{smallmatrix}$	cord $\begin{smallmatrix} & s \\ z & \\ & s \end{smallmatrix}$ twist $\begin{smallmatrix} & r \\ L & \\ & r \end{smallmatrix}$	Plain with: punctate(s)	trailed	trailed and punctate(s)	'plain' weave	dentate	unidentifiable
2	2	15-19	-	1	-	-	-	-	-	-
	3	19-24	-	3	-	-	-	-	-	-
3	1	6-10	-	1	-	-	-	-	-	-
	2	10-16	-	1	-	-	-	-	-	-
4	-	8-36	1	2	-	-	-	-	1	-
	-	ca. 36	-	1	-	-	-	-	-	-
5	1	6-13	1	-	-	-	-	-	-	-
	F9	11-18	-	1	-	-	-	-	-	-
6	2	11-15	1	-	-	-	-	-	-	-
	3	15-20	-	2a,d	-	-	-	-	-	-
	4	20-28	1	-	-	-	-	-	-	-
9	F10	16-20	-	1b	-	1	-	-	-	-
10	1	6-10	-	2e	-	-	-	2	-	-
12	1	9-15	1	3c	-	-	-	-	-	2
	2	15-21	-	1	-	-	-	-	-	1
13	3	18-26	-	1	-	-	-	-	-	-
14	1	10-16	-	1	-	-	-	-	-	-
	2	16-24	-	1	-	-	-	-	-	1
	3	24-33	-	1	-	-	-	-	-	-
15	2	12-18	-	2	-	-	-	-	-	-
18	1	7-13	1	-	-	-	-	-	-	-
	4	25-31	-	1	-	-	-	-	-	-
19	1	9-15	-	1	-	-	-	-	-	-
	2	15-21	-	1	-	-	-	-	-	-
20	1	10-18	-	-	-	1	-	-	-	-
	3	24-30	-	2e	-	-	-	-	-	1
	4	30-36	-	2	-	-	-	-	-	-
	6	42-48	-	2	-	-	-	-	-	-
	7	48-54	1	-	-	-	-	-	-	-
21	1	10-18	1	-	-	-	-	-	-	1
	3	24-34	1	1	1	-	1	-	-	1
S	-	- -	-	6	-	-	-	-	-	-

a - exterior surface plain with narrow trailed lines and punctates; interior surface displays the cord-marking recorded in the table

b - similar cord-marking on both surfaces; two rolls of wedge shaped punctates

c - contains a single cord impression with a $Z\begin{smallmatrix} & z \\ s & z \\ & z \end{smallmatrix}$ cord and a $L\begin{smallmatrix} & l \\ R & l \\ & l \end{smallmatrix}$ twist

d - contains cord impressions with a $S\begin{smallmatrix} & s \\ z & s \\ & s \end{smallmatrix}$ cord and a $R\begin{smallmatrix} & r \\ L & r \\ & r \end{smallmatrix}$ twist

e - exterior surface contains trailed lines

Table 19. Attribute Associations of Shell Tempered Jars in Area I

no.	square	level or level/feat.	CLASS															lip diameter in cm.
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	
1	1	1	1	4	–	–	–	2	2	–	–	–	–	–	–	–	–	–
2	1	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	1	1	1	1	2	–	–	3	–	–	–	–	–	–	–	–	–	–
4	1	1	1	1	2	B	4/45	3	–	2	2	2	4	1	–	–	–	34
5	1	3	1	1	6	H	2/23	3	–	2	2	–	–	–	–	–	–	–
6	1	7	1	3	3	–	–	3	–	–	–	–	–	–	–	–	–	–
7	1	2/1	–	–	–	–	–	–	–	2	2	2	4	–	–	–	–	–
8	1	2/4	1	1	2	B	4/44	3	–	2	2	2	1	1	1	1	2	–
9*	1	2/4	1	2	4	A	3/38	3	–	2	1	–	–	–	–	–	–	30
10	1	3/4	–	–	–	E	2/25	3	–	2	2	–	–	–	–	–	–	–
11	1	3/4	1	3	3	–	–	3	–	–	–	–	–	–	–	–	–	–
12	1	4/4	1	1	2	–	–	3	–	–	–	–	–	–	–	–	–	–
13	1	6/5	1	3	3	B	4/46	3	–	2	2	2	4	1	–	–	–	42
14	1	6/5	1	4	–	–	–	2	3	–	–	–	–	–	–	–	–	–
15	1	7/5	1	4	–	A	4/43	2	3	2	1	4	1	2	1	2	4	34
16	2	1	1	1	2	A	3/39	3	–	2	1	1	3	1	–	–	–	30
17	2	1	1	4	–	–	–	1	2	–	–	–	–	–	–	–	–	–
18	2	2	1	4	–	–	–	1	2	–	–	–	–	–	–	–	–	–
19	3	1	1	4	–	–	–	2	3	–	–	–	–	–	–	–	–	–
20	3	1	1	3	5	–	–	3	–	–	–	–	–	–	–	–	–	–
21	3	2	1	4	–	–	–	2	3	–	–	–	–	–	–	–	–	–
22	3	2	1	3	3	D	2/29	3	–	2	2	–	–	–	–	–	–	–
23	4	all	1	3	3	E	4/40	3	–	2	2	2	4	1	–	–	–	–
24	5	1	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–
25	5	1	–	–	–	–	–	–	2	2	2	–	–	–	–	–	–	–
26	5	1	1	3	3	D	3/31	3	–	2	1	–	–	–	–	–	–	–
27	5	1/7	1	3	3	–	4/47	3	–	–	–	–	–	–	–	–	–	–
28	6	1	1	3	3	–	–	–	–	–	–	–	–	–	–	–	–	–
29	6	1	–	–	–	B	–	3	–	2	2	–	–	–	–	–	–	–
30	6	1	1	1	2	–	–	3	–	–	–	–	–	–	–	–	–	–
31	6	2	–	–	–	–	–	–	–	2	2	2	4	–	–	–	–	–
32	6	2	–	–	–	–	–	–	–	2	2	2	4	–	–	–	–	–
33	6	2	2	1	2	C	4/41	3	–	2	2	–	–	–	–	–	–	–
34	6	2	1	1	1	G	2/25	3	–	1	2	4	1	1	–	–	–	26
35	6	3	1	3	3	A	3/31	3	–	2	1	2	1	1	–	–	–	–
36	6	3	1	2	1	A	4/47	3	–	2	1	–	–	–	–	–	–	41
37	6	3	1	3	3	–	–	3	–	–	–	–	–	–	–	–	–	–
38	6	3	–	–	–	–	–	–	–	2	1	2	–	–	–	–	–	–
39	6	4	–	–	–	–	–	–	–	2	2	2	–	–	–	–	–	–
40	6	4	–	–	–	–	–	–	–	2	2	2	–	–	–	–	–	–

*pieces of this jar also found in level 3

Table 19. (cont.)

no.	square	level or level/feat.	CLASS																lip diameter in cm.
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV		
41	6	4	-	-	-	A	-	-	-	2	1	-	-	-	-	-	-		-
42	7	2	2	4	-	-	-	1	1	-	-	-	-	-	-	-	-		-
43	7	3	1	1	2	B	3/36	3	-	2	2	2	4	1	-	-	-		-
44	7	3	1	3	5	-	-	3	-	-	-	-	-	-	-	-	-		-
45	7	3	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-		-
46	8	2	2	3	3	C	4/46	3	-	2	1	-	-	-	-	-	-		-
47	8	3	-	-	-	-	-	-	-	2	2	3	4	-	-	-	-		-
48	8	3	1	3	3	A	3/37	3	-	2	1	-	-	-	-	-	-		-
49	8	3	1	3	3	-	-	3	-	-	-	-	-	-	-	-	-		-
50	8	4	1	4	-	F	3/31	4	3	2	2	-	-	-	-	-	-		-
51	8	4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-		-
52	8	4	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-		-
53	8	5	-	-	-	-	-	-	-	2	2	4	1	-	-	-	-		-
54*	8	5	1	3	5	B	4/41	3	-	2	2	4	1	1	-	-	-		29
55	9	1	1	3	3	B	4/42	-	-	2	2	-	-	-	-	-	-		-
56	9	2	1	1	2	A	4/40	3	-	2	1	2	4	1	-	-	-		27
57	9	3	1	1	2	A	4/41	3	-	2	1	1	3	1	-	-	-		38
58'	9	3	1	4	-	A	4/42	2	3	2	1	4	1	2	-	-	-		40
59	9	2/10	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-		-
60	9	2/10	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-		-
61	9	2/10	1	3	3	-	-	-	-	-	-	-	-	-	-	-	-		-
62	9	3/10	2	1	7	E	2/28	3	-	2	2	-	-	-	-	-	-		-
63	9	3/10	1	3	3	F	3/37	3	-	2	2	-	-	-	-	-	-		-
64	9	3/10	1	4	-	D	2/22	1	1	2	2	-	-	-	-	-	-		-
65	9	3/10	1	4	-	-	-	1	1	-	-	-	-	-	-	-	-		-
66	9	3/10	1	4	-	-	-	4	3	-	-	-	-	-	-	-	-		-
67	9	3/10	1	4	-	D	3/31	2	3	2	1	1	5	2	-	-	-		28
68	9	3/10	-	-	-	-	-	-	-	2	2	3	4	-	-	-	-		-
69	1	1	-	-	-	-	-	-	-	-	-	-	-	-	7	3	-		-
70	1	4	-	-	-	-	-	-	-	-	-	-	-	-	7	3	-		-
71	1	2/4	-	-	-	-	-	-	-	-	-	-	-	-	4	1	2		-
72	1	2/1	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-		-
73	5	1	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-		-
74	6	1	-	-	-	-	-	-	-	-	-	-	-	-	4	2	4		-
75	6	2	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-		-
76	8	2	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-		-
77	9	4	-	-	-	-	-	-	-	-	-	-	-	-	5	3	-		-
78	9	3/10	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3		-

* pieces of this jar also found in: Area I - t.s.2, L#1; t.s.8, L#4; t.s.9, L#3; F#10. Area II - t.s.20, L#2.

' pieces of this jar also found in: Area I - t.s.6, L#2. Area II - t.s.20, L#2.

Table 20. Attribute Associations of Shell Tempered Jars in Area II

no.	square	level or level/feat.	CLASS															
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
1	10	1	1	1	2	–	–	3	–	2	–	–	–	–	–	–	–
2	12	2	1	4	–	–	–	4	3	–	–	–	–	–	–	–	–
3	13	2	1	4	–	E	2/27	4	3	2	2	2	–	2	–	–	–
4	13	2	1	3	3	–	–	3	–	–	–	–	–	–	–	–	–
5	13	2	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
6	13	2	1	3	3	E	2/22	3	–	2	2	3	–	1	–	–	–
7	13	2	1	4	–	–	–	–	–	–	–	–	–	–	3	1	1
8	13	3	1	3	3	I	1/14	3	–	2	1	2	3	1	6	3	–
9	14	1	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
10	14	1	1	2	4	C	4/42	3	–	2	2	–	–	–	–	–	–
11	14	1	1	4	–	D	3/38	1	1	2	1	1	2	2	–	–	–
12	14	1	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
13	14	1	1	1	2	–	–	3	–	–	–	–	–	–	–	–	–
14	14	2	1	4	–	D	2/27	1	1	2	–	1	–	2	–	–	–
15	14	2	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–
16	14	2	1	3	5	–	–	–	–	–	–	–	–	–	–	–	–
17	14	3	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
18	14	-39"	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
19	16	1	1	4	–	F	3/32	–	–	2	2	–	–	–	–	–	–
20	16	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–
21	16	2	1	4	–	D	2/27	1	1	2	–	–	–	–	–	–	–
22	16	3	1	4	–	A	4/41	1	2	2	1	–	–	–	–	–	–
23	17	2	1	4	–	–	–	4	3	–	–	–	–	–	–	–	–
24	18	1	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
25	18	1	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
26	18	1	1	3	3	–	–	–	–	–	–	–	–	–	–	–	–
27	18	2	1	4	–	H	2/25	4	3	2	1	2	3	2	–	–	–
28	18	2	1	1	2	A	3/38	–	–	2	1	2	–	1	2	3	–
29	18	2	1	–	–	–	4/42	–	–	2	–	–	–	–	–	–	–
30	18	4	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
31	18	4	1	4	–	–	–	4	3	–	–	–	–	–	–	–	–
32	18	4	1	3	5	–	–	3	–	–	–	–	–	–	–	–	–
33	19	1	1	3	5	D	2/25	3	–	2	2	2	–	1	–	–	–
34	19	1	2	3	5	C	3/39	3	–	2	2	–	–	–	–	–	–
35	19	1	1	3	5	C	4/41	3	–	2	2	–	–	–	–	–	–
36	19	2	2	4	–	–	–	1	1	–	–	–	–	–	–	–	–
37	19	2	1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
38	20	1	2	3	5	–	–	3	–	–	–	–	–	–	–	–	–
39	20	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–
40	20	1	1	4	–	–	–	1	2	–	–	–	–	–	–	–	–

Table 20. (cont.)

no.	square	level or level/feat.	CLASS														
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
41	20	2	1	4	-	A	4/41	1	1	2	1	2	-	2	-	-	-
42*	20	2	1	3	5	B	4/41	3	-	2	2	4	1	1	-	-	-
43'	20	2	1	4	-	A	4/42	2	3	2	1	4	1	2	-	-	-
44	20	2	2	1	7	B	4/44	-	-	2	2	2	-	-	-	-	-
45	20	2	1	4	-	-	-	1	1	-	-	-	-	-	-	-	-
46	20	2	1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
47	20	3	1	3	5	C	4/42	3	-	2	2	-	-	-	-	-	-
48	20	3	1	4	-	-	-	2	3	-	-	-	-	-	-	-	-
49	20	6	1	1	3	C	3/37	3'	-	2	2	3	1	1	-	-	-
50	20	6	1	4	-	-	-	4	2	-	-	-	-	-	-	-	-
51	20	6	1	3	3	C	4/48	3	-	2	2	-	-	-	-	-	-
52	20	6	1	4	-	-	3	4	3	-	-	-	-	-	-	-	-
53	20	6	1	-	-	-	-	-	-	3	2	-	-	-	-	-	-
54	20	6	1	3	5	-	-	3	-	-	-	-	-	-	-	-	-
55	20	6	1	4	-	A	3/39	4	3	2	1	2	-	2	-	-	-
56	20	6	1	3	3	-	-	3	-	-	-	-	-	-	-	-	-
57	20	6	1	3	3	-	-	3	-	-	-	-	-	-	-	-	-
58	20	6	1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
59	20	6	1	1		-	-	3	-	-	-	-	-	-	-	-	-
60	20	6	1	4	-	-	-	2	1	-	-	-	-	-	-	-	-
61	20	6	-	-	-	-	-	-	-	2	2	3	1	-	-	-	-
62	20	7	1	1	2	H	3/32	1	1	2	1	1	2	3	-	-	-
63	20	7	1	1	2	-	-	3	-	-	-	-	-	-	-	-	-
64	21	1	1	3	3	-	-	3	-	-	-	-	-	-	-	-	-
65	21	1	1	4	-	-	-	1	2	-	-	-	-	-	-	-	-
66	21	2	1	3	5	B	5/52	3	-	2	2	-	-	-	2	1	1
67	21	2	1	2	1	A	3/33	3	-	2	1	2	3	1	3	1	2
68	21	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
69	21	2	1	1	7	-	-	3	-	-	-	-	-	-	-	-	-
70	21	2	1	1	7	H	2/27	3	-	2	1	-	-	-	-	-	-
71	21	2	1	-	-	F	2/26	-	-	2	2	-	-	-	-	-	-
72	21	3	1	3	-	B	3/39	1	2	2	2	1	-	2	3	-	-
73	21	3	1	3	3	F	4/42	3	-	2	2	-	-	-	-	-	-
74	21	3	1	3	1	-	2	3	-	-	-	-	-	-	-	-	-
75	21	2	1	1	6	-	-	-	-	-	-	-	-	-	6	3	-
76	20	6	-	-	-	-	-	-	-	-	-	-	-	-	7	3	-
77	21	1	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-
78	14	F#11	-	-	-	-	-	-	-	2	2	2	4	-	-	-	-

* pieces of this jar also found in: t.s.2, L#1; t.s.8, L#4+5; t.s.9, L#3, F#10.

pieces of this jar also found in: t.s.6, L#2; t.s.9, L#3.

Table 21. Attribute Associations of Shell Tempered Jars in Surface Sample

no.	SURFACE	CLASS														
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
1		1	3	1	B	4/49	3	–	2	2	–	–	–	–	–	–
2		1	4	–	D	2/28	4	3	2	1	4	1	2	–	–	–
3		1	3	3	–	4	3	–	2	–	–	–	–	–	–	–
4		1	3	5	–	–	3	–	–	–	–	–	–	–	–	–
5		1	1	2	E	2/25	3	–	2	2	–	–	–	–	–	–
6		1	3	3	–	3/38	3	–	–	–	–	–	–	–	–	–
7		–	3	5	–	4	3	–	2	2	–	–	–	–	–	–
8	SURFACE	1	4	–	–	4/42	4	1	2	–	–	–	–	–	–	–
9		1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
10		–	–	–	–	–	–	–	2	1	–	–	–	–	–	–
11		1	4	–	–	–	4	3	–	–	–	–	–	–	–	–
12		1	4	–	–	–	1	1	–	–	–	–	–	–	–	–
13		1	4	–	E	2/28	1	1	2	2	–	–	–	–	–	–
14		1	4	–	–	–	4	3	–	–	–	–	–	–	–	–
15		–	1	7	–	–	–	–	–	–	–	–	–	–	–	–

ondary retouching along the entire edge, +* secondary retouching along the distal half only, +' retouching executed from the ventral surface. These latter symbols refer to the presence or absence and extent of lateral retouch.

A definition of each group is given below. These groupings are a reflection of the research problem for which this report was initiated, i.e. to test the cultural homogeneity of the two areas excavated. If the scrapers recovered from the site had demonstrated greater area diversity, the minutiae with which these groupings are defined would have been unnecessary. Group means and the relative frequency of scraper groups by Area are listed in Tables 22-26.

Group 1—Plano-convex chert flakes with a ventral face consisting of a single flake scar containing a pronounced bulb of percussion and an unmodified striking platform at the proximal end. Sides are usually partially retouched. Dorsal surfaces consist of a ridge or a flat surface formed by the removal of a series of flakes. Group 1 is defined by the possession of three main attributes, i.e. a pronounced bulb of percussion, an unmodified striking platform, and a ventral surface consisting of a single unaltered flake scar. Each of the next three groups differ from Group 1 by the absence of one, two, or all of these attributes respectively. (Pl. 17, A and B; Table 22)

Group 2—Similar to Group 1, except a pronounced bulb of percussion is absent. (Pl. 17, C and D; Table 23)

Group 3—Similar to Group 1, but both the pronounced bulb of percussion and the striking platform are absent (Pl. 18, A and B; Table 23)

Group 4—Similar to Group 1, except the ventral face consists of a number of primary retouching flake scars in addition to the absence of both a pronounced

bulb of percussion and a visible striking platform (Pl. 18, C and D; Table 24)

Group 5—The ventral face of these plano-convex chert end scrapers consists of a single flake scar. A pronounced bulb of percussion and a visible striking platform are absent. The dorsal surface has been flattened by the removal of one or more flakes. Steep retouching occurs around the lateral and proximal edges of the implements in such a fashion that they have the appearance of flat topped,

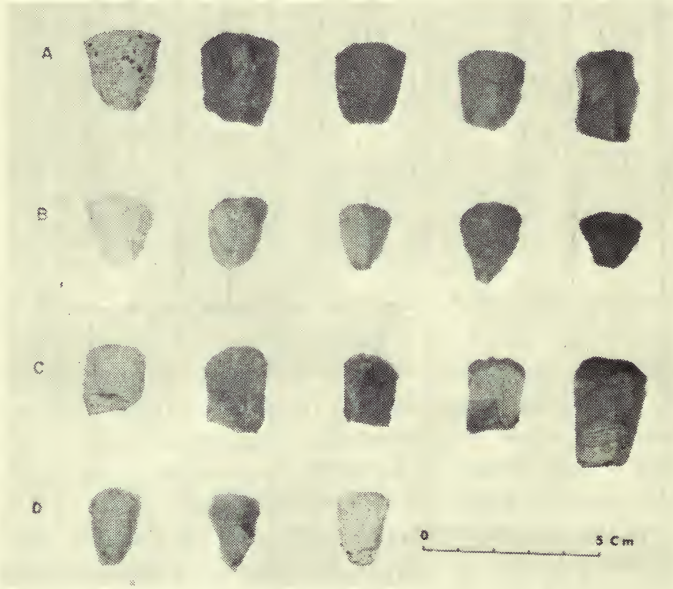

Plate 17. End Scrapers: A—Group 1A, B-Group 1B, C—Group 2A, D—Group 2B

four-sided pyramids. This symmetrical shape is characteristic for the grouping. All proximal ends are at least half as wide as the maximum width. (Pl. 19, A Table 24)

Group 6—Similar to Group 3, except the stone is quartzite rather than chert. (Pl. 19, A and B; Table 24)

Miscellaneous End Scrapers—Eight end scrapers do not conform to any of the above groups, because they are broken or have an unusual combination of attributes. These scrapers differ in the following manner:

nos. 1, 2, 7 in Table 25: dorsal surface formed by a single flake scar; striking platform absence; ventral surface modified by the removal of several flakes; chert.

no. 3: scraping edges on opposite ends of the dorsal and ventral surfaces;

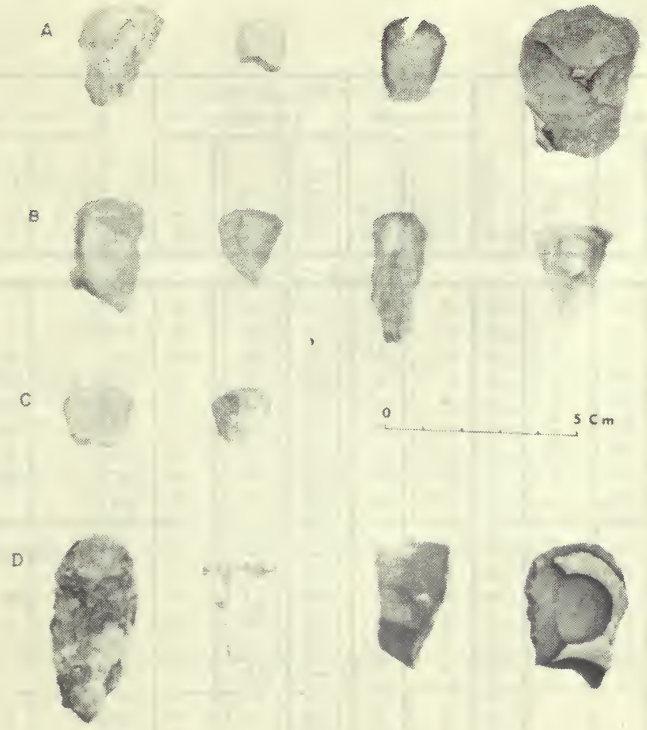

Plate 18. End Scrapers: A—Group 3A, B—Group 3B, C—Group 4A, D—Group 4B

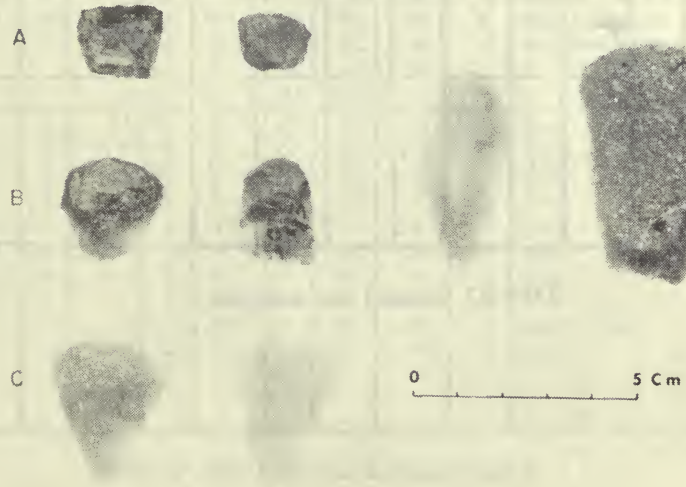

Plate 19. End Scrapers: A—Group 5, B—Group 6A, C—Group 6B

no.	provenience			Cross Section	lateral retouch		dimensions in mm.			color
	Area	Square	Level		Left	Right	Length	Width	Thick.	
Group 1 - A										
1	I	6	2	B	+	-	27	23	8	gray
2	I	6	3	A	+	+	24	20	8	gray
3	I	6	4	A	+'	+'	22	21	8	tan with white
4	I	8	3	A	-	+	17	20	5	tan with white
5	II	14	1	A	+	-	21	17	9	white + brown
6	II	14	2	A	+	+*	21	21	7	light orange
7	II	14	2	A	+	-	23	20	8	gray
8	II	17	1	B	+	+	25	19	6	gray + white
9	II	18	4	B	+*	+	35	22	8	gray
10	II	19	2	A	-	+	25	23	9	white + pink
11	II	19	2	A	+*	+*	25	16	8	light orange
12	II	20	2	A	+	+	22	19	7	gray
13	II	20	4	A	+	+	29	17	9	light brown
14	II	20	6	B	+	+	55	26	13	gray
15	II	20	6	A	+	+	22	18	7	light brown
16	II	20	6	A	+	+	22	19	7	gray
17	S			A	+	-	20	22	8	gray
18	S			B	+	-	32	21	9	gray
19	S			A	+	+	23	16	7	pink
Group 1 - B										
1	I	1	F1-4	A	+	+	23	17	9	white + brown
2	I	1	F5-6	A	-	+	25	19	7	gray
3	I	1	F5-6	A	+'	+'	24	20	8	white
4	I	9	4	A	-	+	17	19	6	gray
5	II	14	3	A	+'	+'	19	20	4	white
6	II	18	4	A	+	-	18	23	8	dark brown
7	II	20	4	A	+	+	20	16	5	gray
8	S			A	+	+	22	16	5	gray

Table 22. Group 1 End Scrapers

no.	provenience: Area	Square	Level/ Feature	Cross Section	lateral retouch: Left	Right	dimensions in mm.: Length	Width	Thick.	color
					Group 2 - A					
1	I	1	1	B	+	+	33	21	7	gray
2	I	4	NVC	A	+	+	21	17	6	white
3	I	5	1	A	+*	+*	55	22	10	light tan
4	I	8	3	C	+	-	33	18	8	light tan
5	II	17	1	A	+'	+	20	18	7	white
6	II	17	1	A	-	+*	25	18	6	gray
7	II	18	1	B	+	-	22	17	9	gray
8	II	21	2	B	-	-	24	17	6	light tan
9	S			B	+	+	33	24	9	gray + pink
					Group 2 - B					
1	I	1	F5-6	A	+*	+*	21	16	5	white
2	I	2	1	A	+	+	24	15	6	white
3	II	20	1	A	-	+*	22	16	7	gray
4	S			A	+	+	24	16	5	light tan
					Group - A					
1	I	8	5	A	+	+	24	18	5	gray
2	I	9	3	A	-	+	11	12	4	tan
3	II	13	2	B	-	+	21	22	5	gray
4	II	17	1	A	+*	+*	40	30	10	gray
5	II	18	1	B	-	-	14	13	4	white
6	II	20	2	A	+*	-	29	19	11	light orange
7	S			B	+	+	25	23	5	white + gray
					Group 3 - B					
1	I	2	1	C	-	+*	35	15	10	gray + brown
2	I	2	1	A	+	+*	28	22	8	yellow
3	I	9	4	A	+	+	22	18	7	gray
4	II	10	1	A	+	+*	30	19	8	gray
5	II	15	1	A	+*	+	19	16	6	gray
6	II	18	2	B	-	-	26	18	6	gray
7	II	18	3	A	+	-	18	17	5	gray
8	II	20	2	C	+*	+*	22	20	8	gray
9	S			A	+*	-	15	14	5	light tan
10	S			A	+	+	23	15	6	gray

Table 23. End Scrapers: Groups 2 and 3

no.	provenience			Cross Section	lateral retouch		dimensions in mm.			color
	Area	Square	Level/ Feature		Left	Right	Length	Width	Thick.	
Group 4 - A										
1	I	9	1	C	-	-	17	15	4	gray
2	II	20	3	A	+	+	17	19	6	white
3	S			B	-	-	21	20	9	dark red
4	S			B	+	+	42	18	12	white
5	S			C	+	-	21	19	7	gray
6	S			C	+*	+*	18	17	5	pink
Group 4 - B										
1	I	1	F4/2	A	+	+	25	20	9	gray
2	I	4	-36"	B	+*	+*	52	23	10	gray + white
3	I	7	1	B	+	+	40	28	8	brown
4	I	8	5	B	+	+	42	19	5	gray + white
5	I	8	5	C	+*	-	34	26	9	brown
6	II	10	1	B	+*	+*	48	28	12	gray
7	II	14	1	B	+*	-	44	24	9	gray + white
8	II	17	1	B	+	-	36	24	8	gray + white
9	II	20	6	C	+	+	36	21	9	gray
10	II	20	6	B	+	+*	33	20	9	gray
11	II	21	3	A	+	+	32	18	8	white
Group 5										
1	I	1	F5/5	B	+	+	17	20	8	gray
2	I	2	3	A	+	+	13	16	4	gray
Group 6 - A										
1	I	1	F4/2	B	+	+	54	36	12	dull yellow
2	I	5	F7/1	B	+	-	47	32	8	white
3	II	12	1	C	+*	+*	44	22	9	white
4	II	14	F11	A	-	-	24	23	8	white + red
5	II	20	6	B	+	+	26	18	6	white + red
6	S			A	+	+	43	34	10	dull yellow
Group 6 - B										
1	II	10	1	A	-	+	34	28	8	dull yellow
2	II	19	F14	A	+	-	35	24	7	white

Table 24. End Scrapers: Groups 4–6

no.	provenience			Cross Section	lateral retouch		dimensions in mm.			color
	Area	Sqaure	Feature/ Level		Left	Right	Length	Width	Thick.	
1	II	14	F11	B	-	-	22	17	6	gray
2	II	14	1	C	-	-	45	27	13	white
3	II	16	3	B	+	-	30	22	11	white
4	II	17	1	B	+	+	17	19	6	white
5	II	17	1	B	+	+	18	21	5	gray
6	II	18	3	B	+	+	14	18	5	gray
7	II	19	1	A	-	-	41	31	9	gray
8	II	20	1	C	+*	+*	36	28	12	white/orange

- no secondary retouch
+ secondary retouch along the entire edge
+* secondary retouch along the distal half only
A maximum thickness adjoins the scraping edge; sloping dorsal surface
B thickness uniform over at least half the scraper length; doral surface flat or longitudinally ridged
C highly irregular surface(s)

Table 25. Miscellaneous End Scrapers

nos. 4-6; broken transversely near the proximal end; chert.

no. 8: markedly biconvex; pronounced bulb of percussion; other attributes similar to Group 6B; quartzite.

Side Scrapers

For purposes of this analysis, a side scraper is defined as a flake that has steep unifacial retouch on one or both lateral edges. These tools have been manufactured with less care than most end scrapers. This is apparent from both their highly irregular shapes and sizes, and from the limited extent of secondary retouching. Side scrapers have been divided into two groups on the basis of material composition.

Group	Area + Site Total	Dimensions in Millimeters		
		Length	Width	Thickness
1 a	I	22.5	21.0	7.3
	II	26.9	20.0	8.1
	site	25.8	20.0	7.9
1 b	I	22.3	18.8	7.5
	II	19.0	19.7	5.7
	site	21.0	18.8	6.5
2 a	I	35.5	19.5	7.8
	II	22.8	17.5	7.0
	site	29.6	19.1	7.6
2 b	I	22.5	15.5	5.5
	II	22.0	16.0	7.0
	site	22.8	15.8	5.8
3 a	I	17.5	15.0	4.5
	II	26.0	21.0	7.5
	site	23.4	19.6	6.3
3 b	I	28.3	18.3	8.3
	II	23.0	18.0	6.6
	site	23.8	17.4	6.9
4 a	I	17.0	15.0	4.0
	II	17.0	19.0	6.0
	site	22.7	18.0	7.2
4 b	I	38.6	23.2	8.2
	II	38.2	22.5	9.2
	site	38.4	22.8	8.7
5	I	15.0	18.0	6.0
	site	15.0	18.0	6.0
6 a	I	50.5	34.0	10.0
	II	31.3	21.0	8.0
	site	38.0	28.1	8.9
6 b	II	34.5	26.0	7.5
	site	34.5	26.0	7.5

Table 26. Mean Dimensions of End Scraper Groups in Millimeters

Group 1—Chert (6 specimens illustrated in Pl. 20)

These scrapers are irregular in shape and pattern of manufacutre. However, all possess a plano-convex cross section, all lack a pronounced bulb of percussion, and, with the exception of the surface find, all lack a striking platform. Dorsal and ventral surfaces of scrapers 1, 2, 4, and 5 in Table 28 have been modified by the removal of a number of flakes. The ventral surface of the other two scrapers contains a single flake scar. Both lateral sides of scrapers 2, 4, and 5 have scraping edges. The column labeled 'length of scraping edge' in Table 28 contains the measurement of the longest edge for these latter scrapers. Scraping edges are either straight (1, 4, 6) or convex (2, 3, 5).

Group 2—Quartzite (10 specimens; several illustrated in Pl. 21)

All of these implements are more or less plano-convex in cross section and irregular in shape. Ventral surfaces of all scrapers except nos. 10 and 14 in Table 28 contain a single flake scar. Scrapers nos. 10, 11, and 13 retain both a pronounced bulb of percussion and an unmodified striking platform. Scraper no. 7 has a bulb of percussion, but lacks a striking platform; no. 12 has a striking platform, but lacks a bulb of percussion. The remaining scrapers lack both of these attributes. Scraper no. 8 consists almost entirely of cortex, except for the narrow scraping edge (Pl. 21, A-left). Scraping edges are convex (7, 13, 16), concave (12), or straight (8-11, 14).

	Group 1		Group 2		Group 3		Group 4		Group 5	Group 6		Total %
	a	b	a	b	a	b	a	b		a	b	
I	13.8	13.8	13.8	6.9	6.9	10.3	3.4	17.2	6.9	6.9	0	99.9
II	27.5	7.5	10.0	2.5	10.0	12.5	2.5	15.0	0	7.5	5.0	100.0

Table 27. Relative Frequencies in Percentages of End Scraper Groups Fro... Area I and Area II

Drills

Two broken drills were found in Area I. Both are carefully retouched and worked on all surfaces. They are long and narrow with the point of maximum width near the basal end. The points of both tools are broken. One of the drills

(Sq. 1, level 4) is bi-convex in cross section and bears smoothing from use on both surfaces. It is of white chert and has maximum dimensions of 35x11 x5 mm. The other drill (Sq. 6, level 2) is made from white quartzite and is also bi-convex in cross section. The broken point was partially reshaped and bears some signs of use. Both drills are illustrated in Plate 22, A.

Miscellaneous Perforators

Two 'perforators' were found in Area I. One of these tools (Sq. 1, Feature 4, level 3) is a symmetrical, bi-convex ovate form with bifacial retouch along the sides of the distal or pointed half. The remainder of the implement is shaped by primary retouch over its entirety. The other perforator (Sq. 6, level 1) has the shape of a scalene triangle and a concave-convex cross section. This tool is retouched only on the point. The maximum dimensions of the first perforator are 48x27x19 mm. and of the second 34x19x7 mm. Both of these tools are illustrated in Plate 22, B.

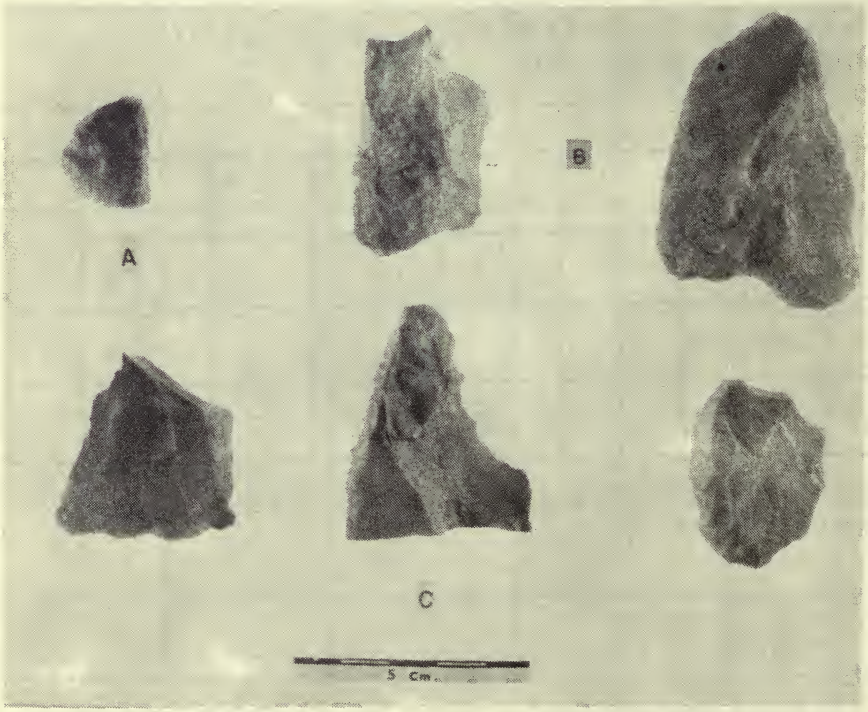

Plate 20. Group 1 Side Scrapers (A-no. 6 in Table 27; B-nos. 1 and 2 in Table 28; C-nos. 3-5 in Table 28)

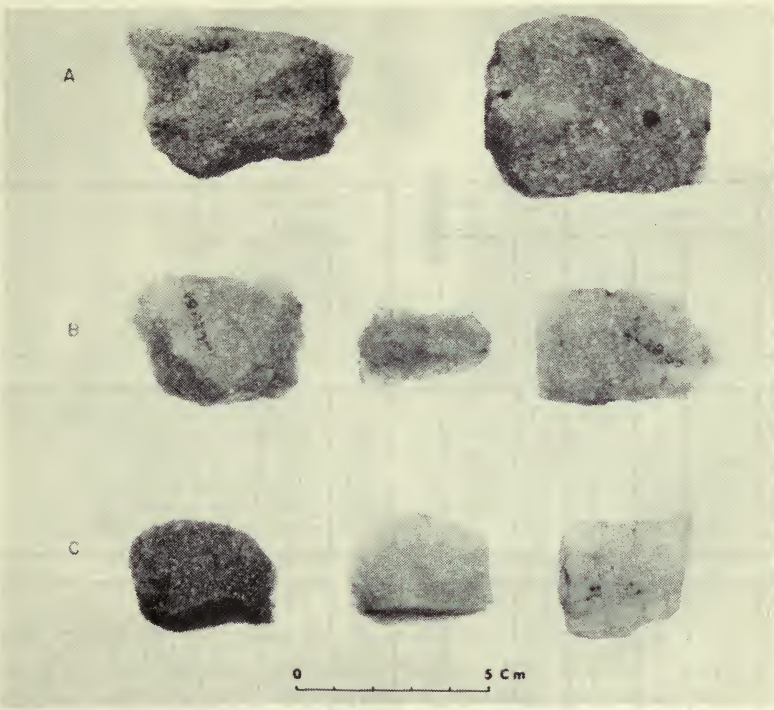

Plate 21. Group 2 Side Scrapers (A-nos. 7-9 in Table 28; B-nos. 10-12 in Table 28; C-no. 14 and 16 in Table 28)

Projectile Points

Small, unnotched, triangular points common to the Mississippian Pattern in Wisconsin are the most common projectile points at the Midway site. Four of the twenty-four points collected from the site are stemmed. These are forms not ordinarily associated with an Upper Mississippian complex. Triangular points are divided into two categories on the basis of material composition.

no.	provenience			Length of Working Edge	lateral retouch		dimensions in mm.			color
	Area	Square	Feature/ Level		Left	Right	Length	Width	Thick.	
Group 1'										
1	I	5	F8/2	29	-	-	47	27	12	white, pink
2	I	6	2	34	+*	-	57	45	10	gray + white
3	II	17	1	32	+*	+*	39	29	11	gray
4	II	20	1	21	-	-	39	36	12	gray + red
5	II	20	6	36	+*	-	49	39	9	gray
6	S			19	-	-	24	19	5	gray + white
Group 2										
7	I	1	F4/4	30	+	-	59	49	14	pink
8	I	1	4	57	-	-	59	41	16	dull yellow
9	I	9	F10	31	+	-	49	42	12	white
10	II	10	3	23	-	-	49	32	[illegible]	white
11	II	14	1	41	-	+	46	36	18	dull yellow
12	II	14	2	20	+	-	36	23	11	dull yellow
13	S			32	+*	-	38	29	13	white
14	S			17	-	-	35	33	8	white
15	S			19	-	+*	41	31	9	white
16	S			32	-	-	39	31	10	pink

- no secondary retouch
+ secondary retouch along the entire edge
+* secondary retouch along the distal half only

Table 28. Side Scrapers

Plate 22. A—Drills B—Miscellaneous Perforators

Group 1—Chert (7 specimens; PL. 23, A and C)

Most of these unnotched triangular points have their greatest length along the medial line (from the apex to the mid-point of the base), but some irregularities are apparent. The lateral sides are usually longer than the width of the implement. All of the broken points in the sample have snapped transversely. The lateral sides are either convex and symmetrical (2-4 and 7 in Table 29), or irregular and asymmetrical (5 and 6 in Table 29). The bases of points 2-4 (Table 29) are straight and the base of no. 7 in convex. Point 1 is broken transversely. Asymmetrical points are very crudely fashioned, while symmetrical forms are retouched over both surfaces.

Group 2—Quartzite (13 specimens; Pl. 24)

Most of these points are symmetrical in outline and crudely worked. Attributes for this group are included in Table 29. The lateral sides of the points are either convex (1, 7, 10, and 12 in Table 29), straight (6, 11, 13), or irregular (5, 9). Bases are convex (1, 6, 10, 12) or straight (7-9, 11, 13). Retouching occurs on all surfaces of a few of these implements (1, 3, 8, 11, 13), but the majority are crudely fashioned and lack extensive retouch (4-7, 9, 10, 12). Specimens 2, 4, 7, and 11 are broken transversely. A cortex remnant adheres to the surface of point no. 12.

The four stemmed projectile points of chert are listed by provenience in Table 29. Points 1 and 4 in Table 29 consist only of the stem and base. Both bases are retouched from both surfaces, but grinding or rubbing is absent.

Grinding is quite distinct along the lateral edges of the stem of point 3. The edges of the blade of this point are slightly convex and are neither beveled or serrated. This point is similar to specimens recovered by William M. Hurley in the Kickapoo Valley (1965: Fig. 4, nos. 6 and 19; Fig. 8, no. 24; Fig. 13, no. 20; Fig. 16, no. 20).

Knives

(13 specimens)

A flat, thin, light brown quartzite flake knife retouched on both surfaces is the only unbroken knife found at the site (second from left in A, Pl. 25). This tool came from Square 10, level 1, and has maximum measurements of 51x24x7 mm. Attributes of knife fragments are listed in Table 30. Six of the fragments are blade tips (1-6 in Table 30); three are midsections (7-9); and three are bases.

no.	provenience				dimensions in mm.			color
	Area	Square	Feature	Level	Length	Width	Thick.	
Group 1 - Chert								
1	I	1	4	2	(18)	13	3	white
2	I	3	-	2	29	15	4	brown, gray
3	I	5	-	1	26	17	4	gray
4	I	9	-	4	17	12	4	white
5	II	17	-	1	19	17	4	brown
6	II	20	-	1	25	16	6	light brown
7	S				27	18	4	brown
Group 2 - Quartzite								
1	I	2	-	1	22	13	3	purple
2	I	3	-	2	-	-	3	yellow
3	I	8	-	1	(11)	11	3	yellow
4	II	12	-	1	-	-	2	pink
5	II	14	-	2	13	13	3	white
6	II	18	-	2	20	14	3	white
7	II	20	-	6	(18)	12	3	white
8	II	21	-	2	24	16	4	white
9	S				21	19	6	white
10	S				23	14	4	white
11	S				(13)	16	3	white
12	S				18	13	3	yellow
13	S				27	17	4	yellow
Stemmed Projectile Points								
1	I	1	-	7	-	-	-	white
2	I	2	-	2	35	17	3	white, pink
3	I	5	-	1	(51)	26	9	pink, red
4	S				(33)	26	6	white, pink

Table 29. Projectile Points

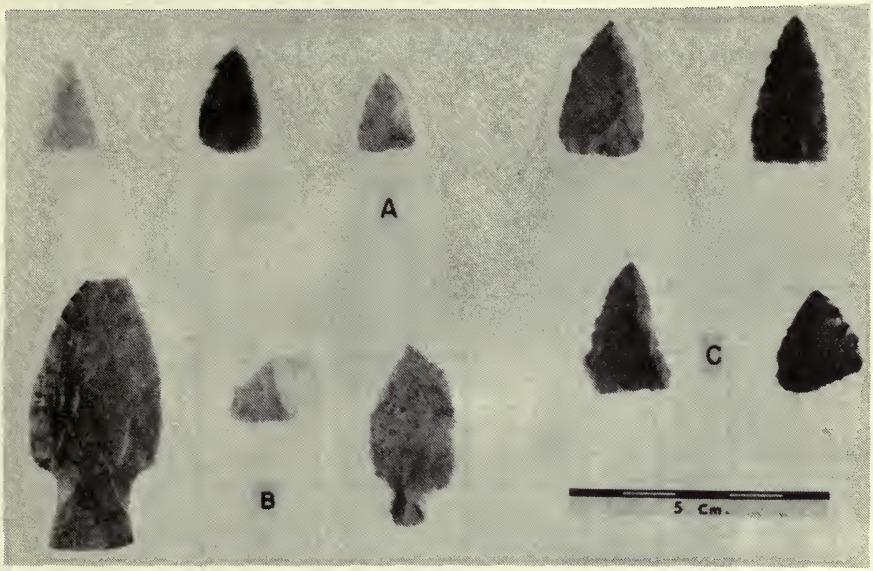

Plate 23. Projectile Points. A—Group 1 (nos. 1,-, 4, 3, 2 in Table 28), B—Stemmed Points (nos. 2, 1, 3 in Table 28), C—Group 1 (nos. 6 and 5 in Table 28).

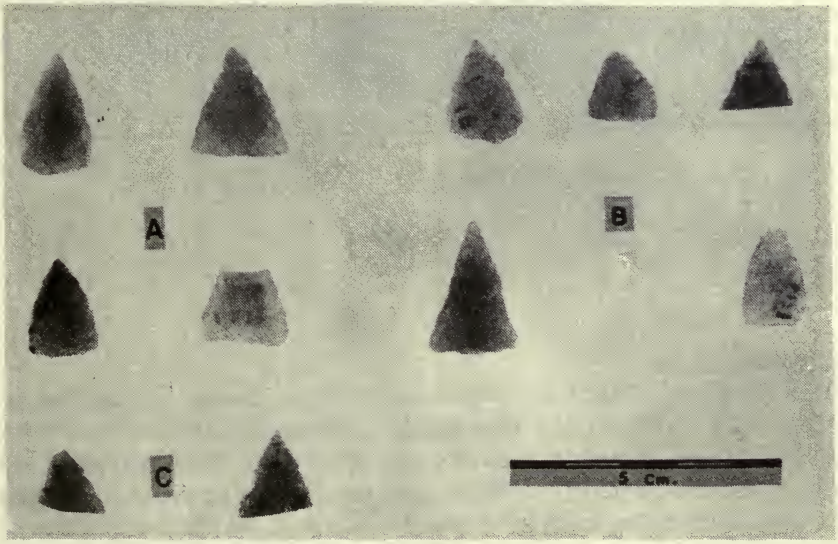

Plate 24. Projectile Points: Group 2. (A—Surface, nos. 10 and 9 in top row and 11 and 12 in bottom row in Table 28; B—Area II, top row: nos. 6, 5, 4 in Table 28, bottom row: nos. 8 and 7 in Table 28, C—Area I, nos. 2 and 3 in Table 28)

(10-11). All are chert except two quartzite tips (2, 6) and a quartzite midsection (8). All fragments except no. 10 have been shaped by primary bifacial retouch and secondary retouch along the edges. Knives are illustrated in Plates 25 and 26 (B and C).

Table 30. Knive Fragments

no.	provenience				dimensions in mm.			color
	Area	Square	Level		Length	Width	Thick.	
1	I	7	1	tip	–	–	–	gray
2	II	20	4	"	–	–	–	white
3	II	21	1	"	–	–	–	gray
4	S	–	–	"	–	–	–	white
5	S	–	–	"	–	–	–	gray
6	S	–	–	"	–	–	–	white
7	I	6	2	mid-	72	45	26	gray
8	II	20	1	section	85	50	33	dull purple
9	S	–	–	"	–	–	–	gray
10	II	20	1	base	(31)	23	8	gray
11	II	20	2	"	(32)	21	7	gray
12	S	–	–	"	(29)	23	7	gray, orange

Core Tools

Eight irregularly shaped dull yellow quartzite implements are classified as core tools (Pl. 29; Table 31). It is difficult to determine whether all of these were actually used as tools, or if some are discarded cores. The jaggedness of the 'working' edges and signs of crushing suggest that they are general purpose tools employed for chopping, cutting, or possibly scraping. No standardized size or pattern of manufacture is apparent. Three are irregularly shaped and have a single working edge (3, 5, 6 in Table 31). The other five have bi-convex bodies and two fairly parallel working edges. All have been shaped by bold percussion flaking.

Plate 25. Knives. (A—nos. 3, —, 11, 10 in Table 30; B—no. 1 in Table 30; C-nos. 5, 4, 12, 6 in Table 30)

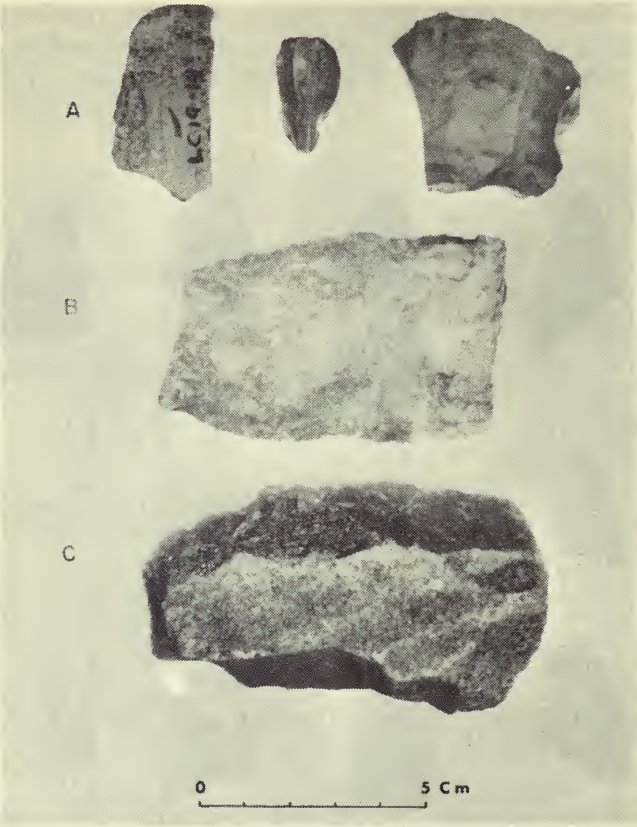

Plate 26. Cores and Knives. A—Cores (nos. 1—3 in Table 32), B and C—Core Knives (nos. 7 and 8 in Table 30).

Table 31. Core Tools

no.	Area	Square	Level/ Feature	Length mm.	Width mm.	Thickness mm.
1	I	1	F5 L7	72	50	30
2	I	6	2	56	40	24
3	II	18	1	74	59	29
4	II	18	5	64	53	38
5	II	19	1	97	72	38
6	S	-	-	75	49	45
7	S	-	-	79	46	18
8	S	-	-	58	50	24

Cores

Nine flake cores were found at the site (Pl. 26, A; Table 32). Small 'ribbon' flakes were removed from the smaller cores.

Hammerstones

A few pieces of stone are roughly sperical and have irregular, pitted or crushed surfaces (Pl. 28, A; Table 32).

Plate 27. Core Tools

Plate 28. Hammerstones (A) and Miscellaneous Ground Stone (B). (A—nos. 3, 2, 1 in Table 32; B—no. 1) (B is 12 cm. in length.)

no.	provenience				dimensions in mm.			color
	Area	Square	Feature/ Level		Length	Width	Thick.	
cores								
1	I	1	F5/8	chert	45	22	16	dull yellow
2	I	2	1	"	26	19	11	gray
3	I	2	3	"	43	42	28	gray
4	I	6	2	quart-	78	71	27	dull yellow
5	I	9	3	zite	63	47	45	dull yellow
6	I	9	F10	"	66	64	44	dull yellow
7	I	9	F10	"	63	55	42	white
8	II	18	5	chert	30	24	18	gray
9	II	20	7	"	35	30	20	gray
hammerstones								
1	I	9	3	quart.	63	48	47	dull yellow
2	I	9	F10/3	chert	66	53	42	dull yellow
3	I	9	F10/3	quart.	63	54	41	dull yellow

Table 32. Cores and Hammerstones

GROUND STONE ARTIFACTS

Abrading Stones

Four ferruginous sandstone abraders were ground into similar shapes before use (Pl. 29; Table 33). Except for no. 3 in Table 33, all of these tools possess at least one groove that could have been used in smoothing arrowshafts. A brief description of each abrader is given below:

Abraders 1 and 3 in Table 33 contain multiple grooves (Pl. 29, B and A right). The latter tool has three parallel longitudinal grooves, semicircular in cross section, running along the length of one surface. The grooves are all 4 mm. in width, but range from 1-2 mm. in depth. Two longitudinal grooves run the length of the tool on the reverse surface. One groove is 2 mm. wide and barely perceptible. The other is irregular, varying from 3-8 mm. in width and 1-2 mm. in width. Both sides contain short irregular gashes, which have been worn into their surfaces. The gashes are 1 mm. wide, 1 mm. deep, and vary from 8-13 mm. in length. Except for the grooves and three gashes, all four sides are smooth. Both ends appear broken. Abrader no. 1 has a single, semicircular, longitudinal groove, 11 mm. in width and 5 mm. in depth, running the length of one surface. Two smaller shallow grooves, 2 and 3 mm. in width, run nearly parallel along the length of the reverse side. A similar groove parallels these along one narrow side. This groove is 2 mm. wide, quite shallow, and distinct. Both ends are broken.

Both abraders 2 and 4 in Table 33 have a single central longitudinal groove, semicircular in cross section (Pl. 29, A left and C). These grooves run the length of the tools and measure 7 mm. in width and 4 mm. in depth for the former and 8 mm. and 1 mm. for the latter. The remaining surfaces are smooth and rounded except for the ends, which are all broken with the exception of one rounded end on no. 4.

Table 33. Abrading Stones

	Test	Feature	Level	Length	Width	Thickness
no.	Square	#	-	cm.	cm.	cm.
1	1	4	-	3.2	4.7	2.6
2	1	4	-	5.3	3.6	2.3
3	1	4	-	4.7	4.1	2.2
4	10	-	2	4.9	4.8	2.2

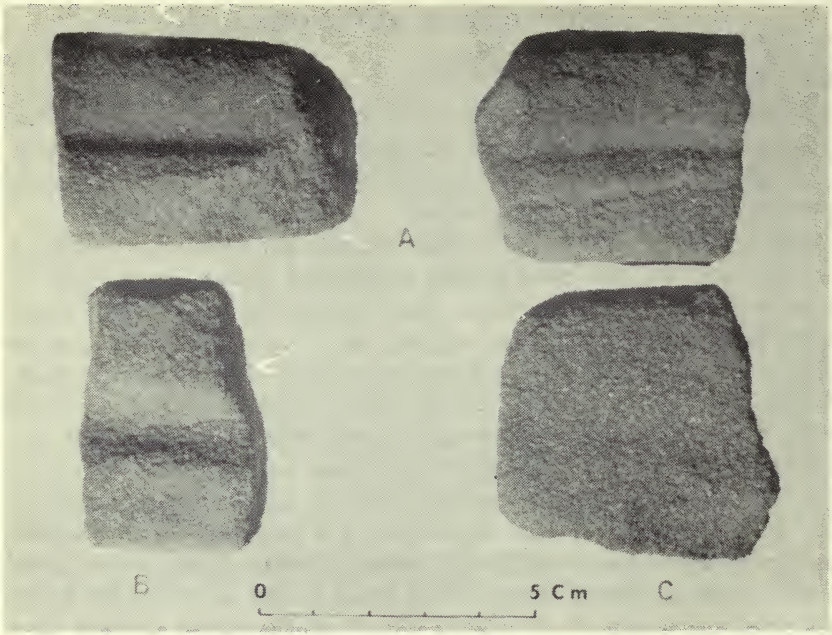

Plate 29. Abrading Stones. (A—nos. 2 and 3 in Table 33; B—no. 1 in Table 33; C—no. 4 in Table 33)

Grinding Stone

A fine textured sandstone implement has parallel sides and rounded ends of different sizes. Grinding has rounded the larger end into a curved butt, the surface of which is smooth and flat in the arch it perscribes. The stone was clearly employed with a rocking motion when used on this end. The smaller end is pitted and may have been used for 'hammering.' The tool was found in Square 1, Feature 4, and has maximum dimensions of 9.5x7.3x6.8 cm.

Catlinite Fragments

Three pieces of ground and sawed catlinite were found at the site. One piece (Sq. 8, level 4) has maximum dimensions of 2.2x0.4x0.3 cm. (Pl. 30, E right). A second (Sq. 19, level 2) has maximum dimensions of 2.7x1.7x0.6 cm. (Pl. 30, E left). Neither piece has an apparent function or design. The third piece (Sq. 20, level 6) is part of a small disc with a small semicircular perforation in the center (Pl. 30, D). Dimensions of the broken disc are 1.9x0.7x0.3 cm.

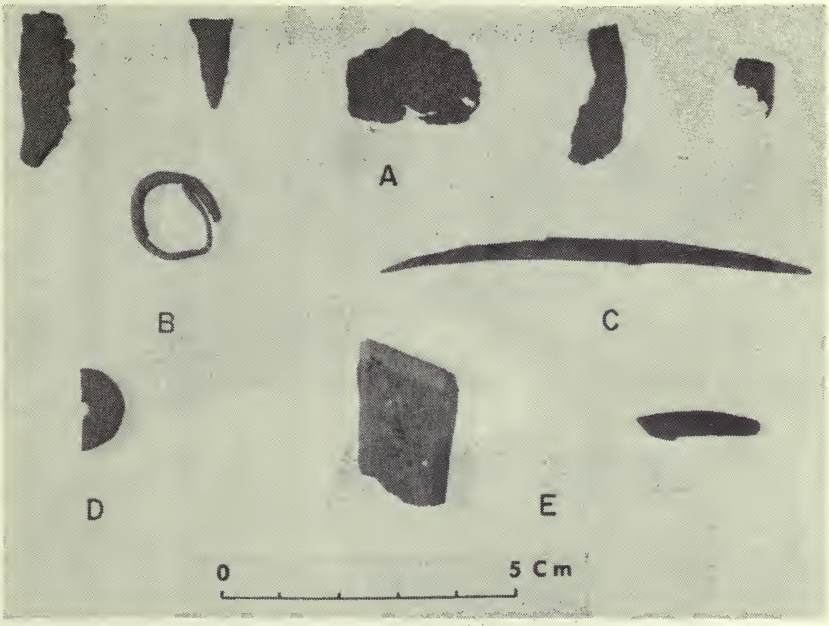

Plate 30. Copper and Catlinite Artifacts

Miscellaneous Ground Stone

Five worked stones are either too small to identify with any functional category or do not fit into any of the above categories. They are: 1)a large rounded pebble (12x3x1.5 cm.) from Square 3, level 2, with pecking marks on both flat sides and on one rounded end; 2) a small fragment of what may be a sandstone abrader from Square 8, level 5, has a semicircular groove 25 mm. wide and 2 mm. deep; 3) a small fragment of a ground stone disc less than 5 mm. thick from Square 20, level 1; 4) two large stones of quartzite from Square 6, level 2 and Feature 14 are rounded on one end. No. 1 is illustrated in Plate 28, B. The quartzite stones in no. 4 may be shaped by weathering or other non-cultural factors (Pl. 31).

Plate 31. Miscellaneous Ground Stone: no. 4 (A—Sq. 19, Feature 14; B—Sq. 6, level 2)

Utilized Flakes

Of the 3207 flakes found IN SITU at the site 387 or 12.1% are either bifacially or unifacially retouched along part of one or more edges. The mean length of these flakes is about 44 mm. and the maximum length is 74 mm. 1.9% of the 3207 flakes have bifacial retouching along the margins, while 10.1% are unifacially retouched. 44% of the 62 bifacially retouched flakes are from Area I and 56% are from Area II. Of the 325 unifacially retouched flakes, 45% are from Area I and 55% are from Area II. These computations and those in Table 34 include only those flakes found IN SITU. The distribution of utilized flakes is listed in Tables 39-40.

Area	bifacial retouching				unifacial retouching				% of flakes utilized
	chert		quartz.		chert		quartz.		
	no.	%	no.	%	no.	%	no.	%	
I	15	56	12	44	100	68	47	32	13.1
II	14	40	21	60	118	66	60	34	11.4
site total	29	48	33	52	218	67	107	33	12.1

Table 34. Numbers and Percentages of Utilized Flakes by Material Composition (quartz = quartzite)

Unmodified Flakes

Of the flakes found IN SITU 2820 or 87.9% bear no signs of retouching or use. Forty-one per cent or 1159 waste flakes are from Area I and 59% or 1661 are from Area II. The above computations and those in Table 35 include only those flakes found IN SITU. Table 39 and 40 include a listing of these flakes by provenience unit. Approximately 80% of the chert refuse consists of a light gray material with white blotches throughout its matrix. Sources for this chert are local. The largest unmodified flakes are of quartzite. In the computations in

Area	chert	quartzite no. / %					quartz	obsidian
	no./ %	red	yellow	white	misc.	total	no./ %	no./ %
I	450 38.8	74 6.4	336 29.0	237 20.5	57 4.9	704 60.8	4 0.3	1 0.09
II	697 42.0	119 7.2	491 29.6	326 19.6	18 1.1	954 57.5	9 0.5	1 0.06
site total	1147 40.7	193 6.8	827 29.3	563 20.0	75 2.7	1658 58.8	13 0.5	2 0.07

Table 35. Numbers and Percentages of Unmodified Flakes by Material Composition and by Color for Quartzite

Table 35, quartzite flakes are separated by color. Even though the range of colors can be found in a single deposit or even on a large core, a preferential selection of the colors might reflect differences between the areas tested. Of the chert flakes 39% are from Area I and 61% from Area II. 41.5% of the unmodified quartzite flakes are from Area I and 57.5% from Area II.

Less than 5% of all flakes from the site are small 'blades.' The remaining flakes are irregular in form.

BONE IMPLEMENTS

The head of a bison scapula hoe and a small portion of its posterior border (Pl. 32, D and E) were found at a depth of 14 inches in Feature 10. Polish along one border of the jagged neck region suggests the tool may have continued in use after breakage. Characteristic signs of wear are present along the lateral edges of the glenoid cavity. Wear on the anterior side of the shattered section of the posterior border indicates that a hole was present in the infraspinous fossa. Two other bone implements came from Feature 10. A fragment with one blunt spatulate end was also at a depth of 14 inches (Pl. 32, B). It measures 62 mm. in length and 19 mm. in width. A worked swan humerous was 23 inches below the surface (P l. 32, C). A gash had been made across one surface and a section of bone 20 mm. wide and at least 44 mm. long removed. Shine on the bone suggests that it was used as a tool. A small fragment of bone from a depth of 40 inches in Feature 5 is cut and worked on one end and may be part of a tube.

A worked deer metapodial from a depth of 48 inches in Test Square 20 is the only worked bone from Area II. The bone had been split longitudinally and signs of wear are visible along the edges formed by the split. This implement is 65 mm. in length and 20 mm. in width.

COPPER ARTIFACTS

Worked copper was found only in Area I. A ring-shaped artifact 16 mm. in diameter came from 15 inches below the surface in Feature 10; the ends of the object overlap (Pl. 30, B). A 73 mm. long double-pointed perforator somewhat rectangular in cross-section came from Square 9 at a depth of 10 inches (Pl. 30, C). Five partially disintegrated fragments of sheet copper measuring from 10-27 mm. in length and 7-17 mm. in width also came from Area I (Pl. 30, A). One fragment was found in Feature 1 and the other four in levels 3, 4, and 5 of Square 8.

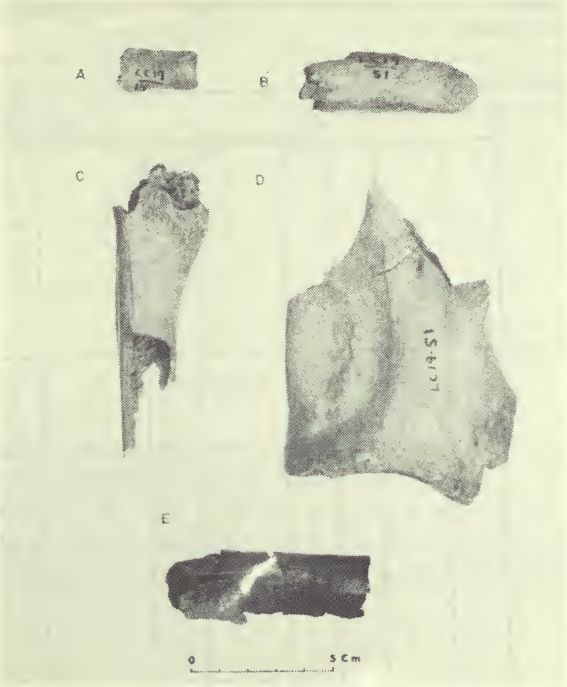

Plate 32. Bone Implements. (B is 62 mm. in length)

FAUNAL REMAINS

Mammal and fish bones were identified by Charles E. Cleland of the Michigan State Museum. Mollusk specimens were identified by the writer. Table 36 lists the identifiable mammal and fish by species and the suggested percentage used in the meat diet. Table 37 below contains a list of the identifiable mollusks. The distribution of unidentifiable mollusk remains is recorded in Tables 39 and 40.

Single specimens of AMBLEMA PERUVIANA were found in test squares: 1 (levels 4 and 7; Features 2, 4, and 5), 5 (level 3), 6 (levels 3 and 4), 9 (Feature 10), 14 (levels 2 and 3), 18 (levels 4 and 5), 20 (levels 4, 6, and 7), 21 (levels 1 3). A single QUADRULA PUSTULOSA was in level 4 of Square 20. The STROPHITUS RUGOSUS specimen came from Feature 2. All the remaining shells came from a tightly packed concentration in Square 5 designated Feature 9.

Table 36. Identifiable Fauna by species and suggested percentage used in meat diet (excluding mollusks)[1]

SPECIES	SECTION A						SECTION B		
	no. of bones	approx. no. of individs.	no. in Area I	no. in Area II	live wt. in lbs.	% usable	lbs. usable meat per individ.	lbs. usable meat per species	% in meat diet
Deer	20	11	5	6	170	50	85	1700	47.3
Dog	19	9	6	3	30	50	15	135	3.7
Beaver	12	8	5	3	45	70	31.5	258	7.2
Elk	1	1	1	0	700	50	350	350	9.7
Bison	1	1	1	0	1200	50	600	600	16.7
Bear	5	2	0	2	300	70	210	420	11.7
Muskrat	4	3	1	2	3	70	2.1	8.4	
Woodchuck	2	1	1	0	8	70	5.6	11.2	1.1
Marten	1	1	0	1	3	70	2.1	2.1	
Raccoon	1	1	0	1	25	70	17.5	17.5	
Prairie pocket gopher	2	2	0	2					
Eastern mole	1	1	0	1					
Snapper	2	2	1	1	50	20	10	20	
Soft shell turtle	1	1	1	0	50	20	10	10	0.9
Painted turtle	1	1	1	0	20	20	4	4	
Passenger pigeon	1	1	1	0	1.0	70	0.7	0.7	
Swan	1	1	1	0	10	70	1.0	7.0	
Common mallard	1	1	0	1	2.5	70	1.75	1.75	0.2
Wood duck	1	1	0	1	1.5	70	1.05	1.05	
Channel catfish	3	1	1	0	4	80	3.2	3.2	
Catfish family	93	14	7	7	0.5	80	0.4	5.6	
Longnose gar	5	2	1	1	2	80	1.6	3.2	
Bowfin	45	9	2	7	2.5	80	2.0	18.0	0.9
Stizostodion spp.	10	5	0	5	0.5	80	0.4	2.0	
R. black bullhead	2	2	0	2	0.5	80	0.4	0.8	
Sucker spp.	1	1	0	1	0.5	80	0.4	0.4	
TOTAL								3576	100

[1]Table 36 is slightly modified in presentation from the original data provided by Charles E. Cleland.

Table 37. Frequency of Identifiable Mollusks by Species

Amblema peruviana (Lamarck)	—102	Fusconaia undata (Barnes)	—6
Quadrula pustulosa (Lea)	— 14	Ligumia recta (Lamarck)	—1
Quadrula quadrula (Raf)	— 11	Strophitus rugosus (Swainsom)	1
Fusconaia ebenus (Lea)	— 11		

FLORAL REMAINS

Plant remains from the Midway site were identified by Richard A. Yarnell. Table 38 lists the identifiable remains. Yarnell identified most of the wood charcoal sent to him as oak. The plum pits have been identified as PRUNUS AMERICANA (Marsh), the hickory nut as CARYA OVATA (K. Koch), the acorn as QUERCUS sp. and the bean cotyledons as PHASEOLUS VULGARIS (Lam.).

Table 38. Plant Remains from the Midway Site (k=kernel)

square	level	feature	corn	beans	other
1	1		cob	½	
1	1	3			2 plum pits
1	2	1		½	
1	6	5		½	
1	7		2k		
14	2				acorn shell
14		11	5k, cob		
18	2		1k	½	
19	1			½	
20	2		1k, cob		hickory shell
20	6		1k, cob		

Table 39. Listing of Unidentifiable Shell, Utilized Flakes, Unmodified Flakes, Shell Tempered Body Sherds (Plain and Decorated), and Grit Tempered Sherds By Provenience Unit and Level for Area I

SQUARE	LEVEL or FEATURE	DEPTH IN INCHES FROM SURFACE	unidentifiable shell	Utilized Flakes		Unmodified Flakes		Shell Tempered Pottery Class X Code											grit tempered sherds
				chert	quartzite	chert	quartzite	1	2	3	4	5	6	7	8	9	10	11	plain	
1	1	8-14	x	5	1	25	39	1	1	2	-	-	-	-	-	-	-	-	34	-
	2	14-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-
	3	20-24	x	-	-	7	7	1	2	-	-	-	-	-	-	-	-	-	10	-
	4	24-28	-	2	-	9	10	1	4	-	-	-	-	-	-	-	-	-	12	-
	5	28-32	-	1	-	2	11	-	-	-	-	-	-	-	-	-	-	-	5	-
	6	32-36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	36-40	x	2	3	5	11	1	3	3	-	1	1	-	-	-	-	-	14	-
	8	40-44	-	-	-	3	4	2	1	1	-	-	-	-	-	-	-	-	8	-
	F1	12-18	x	-	1	2	4	-	-	1	-	-	-	-	-	-	-	-	9	-
	"	18-24	x	-	-	1	3	-	1	3	-	-	-	-	-	-	-	-	6	-
	"	24-30	x	1	1	3	4	1	1	-	-	-	-	-	-	-	-	-	8	-
	F2	9-22	x	1	-	-	4	-	1	-	-	-	-	-	-	-	-	-	4	-
	F3	8-23	x	4	-	13	14	-	1	-	-	-	-	-	-	-	-	-	27	-
	F4	11-20	x	2	-	2	9	1	-	2	-	-	-	-	-	-	-	-	12	-
	"	20-24	x	3	1	3	11	-	4	-	-	-	-	-	-	-	-	-	18	-
	"	24-30	x	6	-	9	12	-	-	-	-	-	-	-	-	-	-	-	12	-
	F5	32-36	x	-	2	2	28	1	5	-	-	-	-	-	-	-	-	-	27	-
	"	36-40	x	1	3	4	37	4	4	4	1	1	-	-	-	-	-	-	46	-
2	1	9-15	x	6	5	15	36	-	2	-	1	-	-	-	-	-	-	-	34	-
	2	15-19	x	2	4	12	19	-	1	1	-	-	-	-	-	-	-	-	23	1
	3	19-24	-	1	3	1	16	2	-	3	-	-	-	-	-	-	-	-	15	3
	4	24-32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1	6-10	-	1	2	19	15	3	2	-	1	-	-	-	-	-	-	-	37	1
	2	10-16	-	4	-	3	11	2	2	1	-	1	-	-	-	-	-	-	34	1
	3	16-24	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	7	-
	F6	16-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	8-36	x	4	6	24	49	1	4	-	-	-	-	-	-	-	-	-	24	3
	-	ca. 36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Table 39. (cont.)

SQUARE	LEVEL or FEATURE	DEPTH IN INCHES FROM SURFACE	unidentifiable shell	Utilized Flakes		Unmodified Flakes		Shell Tempered Pottery Class X Code											grit tempered sherds
				chert	quartzite	chert	quartzite	1	2	3	4	5	6	7	8	9	10	11	plain	
5	1	6-13	x	4	2	12	19	-	3	1	-	-	1	-	-	-	1	-	23	2
	2	13-20	-	1	-	-	2	-	2	-	-	-	-	-	-	-	-	-	3	-
	3	20-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F7	17-22	x	3	1	9	15	-	2	2	-	-	-	-	-	-	-	-	34	-
	F8	19-24	-	1	-	3	4	1	5	-	-	-	-	-	-	-	-	-	10	-
	F9	11-18	-	1	1	-	2	-	1	-	-	-	-	-	-	-	-	1	5	1
6	1	6-11	x	9	3	14	26	3	6	2	-	-	-	-	-	-	-	-	91	-
	2	11-15	-	6	4	23	31	4	14	6	1	-	1	-	-	-	-	-	90	1
	3	15-20	x	6	2	9	17	1	4	-		-	-	-	-	-	-	-	2	2
	4	20-28	x	2	1	10	11	2	3	2	-	-	1	-	-	-	-	-	32	1
7	1	6-12	x	-	1	15	10	1	4	-	1	-	-	-	-	-	-	-	40	-
	2	12-18	x	3	-	4	1	1	3	-	1	-	-	-	-	-	-	-	23	-
	3	18-30	x	-	-	5	5	3	1	1	-	1	-	-	-	-	1	-	53	-
8	1	5-12	x	4	1	15	26	2	4	1	-	-	-	-	-	-	-	-	23	-
	2	12-18	x	2	-	22	11	-	7	1	-	-	-	-	-	-	-	-	43	-
	3	18-24	-	3	2	35	16	-	5	2	-	-	1	-	-	-	-	-	35	-
	4	24-30	x	3	-	47	16	4	6	3	-	-	1	-	-	-	-	-	57	-
	5	30-36	x	4	-	13	16	1	7	7	-	-	2	-	-	-	-	-	38	-
9	1	6-12	x	5	3	5	23	2	6	-	-	-	1	-	-	-	-	-	40	-
	2	12-18	-	-	2	-	4	-	1	-	-	-	-	-	-	-	-	-	68	-
	3	18-24	-	1	-	4	6	2	2	-	1	-	1	-	-	-	-	-	18	-
	4	24-29	-	3	1	9	30	1	2	1	-	-	-	-	-	-	-	-	17	-
	5	29-34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	34-38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	38-42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F10	12-16	-	1	-	4	18	1	2	1	2	-	-	1	-	-	-	-	24	-
	"	16-20	x	4	1	13	24	3	3	1	-	-	1	1	-	-	-	-	44	1
	"	20-25	x	3	-	14	16	-	-	-	-	-	-	-	-	-	-	-	35	-

Table 40. Listing of Unidentifiable Shell, Utilized Flakes, Unmodified Flakes, Shell Tempered Body Sherds (Plain and Decorated), and Grit Tempered Sherds By Provenience Unit and Level for Area II

SQUARE	LEVEL or FEATURE	DEPTH IN INCHES FROM SURFACE	unidentifiable shell	Utilized Flakes		Unmodified Flakes		Shell Tempered Pottery Class X Code											grit tempered sherds
				chert	quartzite	chert	quartzite	1	2	3	4	5	6	7	8	9	10	11	plain	
10	1	6-10	-	13	7	20	37	2	2	-	-	-	-	-	-	-	-	-	32	4
	2	10-16	-	3	-	3	7	1	1	-	-	1	-	-	-	-	-	-	12	-
	3	16-20	x	1	-	-	4	-	1	-	-	-	-	-	-	-	-	-	1	-
11	-	sterile																		
12	1	9-15	-	1	1	12	35	1	1	1	-	-	-	-	-	-	-	-	34	5
	2	15-21	-	1	1	4	11	-	1	1	-	-	-	-	-	-	-	-	15	1
	3	21-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
13	1	8-13	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	4	-
	2	13-18	-	-	1	3	3	-	1	-	-	-	-	-	-	-	-	-	12	-
	3	18-26	-	1	1	-	-	-	2	-	-	-	-	-	-	-	-	-	6	1
14	1	10-16	-	6	3	32	77	3	-	-	-	-	-	-	-	-	-	-	88	2
	2	16-24	x	4	3	25	70	2	6	-	-	1	1	-	-	1	1	-	66	4
	3	24-33	x	3	3	8	32	-	1	-	-	-	-	-	-	-	-	-	20	1
	F11	32-45	-	3	-	5	19	5	1	-	-	1	-	-	-	-	1	2	41	-
15	1	6-12	-	4	-	1	4	-	-	-	-	-	-	-	-	-	-	-	1	-
	2	12-18	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	2
	F12	14-23	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	F13	ca.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	1	5-9	-	3	2	-	12	3	-	-	-	-	-	-	-	-	-	-	12	-
	2	9-15	-	2	2	5	29	-	-	-	-	-	-	-	-	-	-	-	44	-
	3	15-21	-	1	5	3	26	1	3	-	-	-	-	-	-	-	-	-	44	-
17	1	7-13	x	6	3	47	23	1	-	-	-	-	-	-	-	-	-	-	13	-
	2	13-19	-	1	-	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 40. (cont.)

SQUARE	LEVEL or FEATURE	DEPTH IN INCHES FROM SURFACE	unidentifiable shell	Utilized Flakes		Unmodified Flakes		Shell Tempered Pottery Class X Code										plain	grit tempered sherds
				chert	quartzite	chert	quartzite	1	2	3	4	5	6	7	8	9	10	11	
18	1	7-13	-	8	2	41	30	4	2	-	-	-	1	-	-	-	-	-	72	1
	2	13-19	x	5	4	23	38	2	3	1	1	-	-	1	-	-	-	-	80	-
	3	19-25	x	3	3	13	13	-	-	1	-	-	-	-	-	-	-	-	35	-
	4	25-31	x	1	-	18	18	1	2	1	-	-	-	-	-	-	-	-	51	1
	5	31-38	-	1	-	4	3	-	2	-	-	-	-	-	-	-	-	-	10	-
19	1	9-15	-	9	6	13	34	1	3	2	-	-	-	-	-	-	-	-	34	1
	2	15-21	-	2	2	5	26	1	-	1	-	-	-	-	-	-	-	-	27	1
	3	21-28	-	-	-	2	4	-	1	-	-	-	-	-	-	-	-	-	2	-
	F14	14-23	-	2	1	5	18	-	-	-	-	-	-	-	-	-	-	-	11	-
	F15	18-31	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-
20	1	10-18	-	10	8	79	53	3	4	1	-	-	1	-	-	-	-	-	37	1
	2	18-24	-	9	3	84	64	5	4	3	1	-	-	-	1	-	-	-	74	-
	3	24-30	-	3	2	48	30	-	6	-	-	-	-	-	-	-	1	-	39	2
	4	30-36	x	1	1	14	21	1	2	1	-	-	-	-	-	-	-	-	36	2
	5	36-42	x	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	49	2
	6	42-48	x	14	4	43	82	4	5	4	1	-	-	-	-	-	-	-	100	2
	7	48-54	x	1	1	15	20	-	1	-	-	-	-	-	-	-	-	-	27	1
21	1	10-18	x	5	5	60	47	3	3	1	-	1	-	-	-	-	-	-	29	2
	2	18-24	x	4	3	32	25	2	2	4	-	-	-	-	-	-	-	-	38	-
	3	24-34	-	1	3	23	30	-	4	-	-	-	-	-	-	-	-	-	29	5

INTERPRETATIONS

Intra-Site Homogeneity

Obviously the fragmented nature of the grit tempered potter and the absence of stratification of components in the site debris limit the extent to which interpretations may be carried. The tentative placement of some specimens into types suggests that the grit tempered sherds are part of earlier Middle and early Late Woodland components and, therefore, not directly associated with the Orr Phase material. Corroborating evidence at the Midway site for this interpretation is the juxtaposition of extended burials containing shell tempered pottery on circular burials containing sherds of the Woodland type (McKern, 1945:167-168). Possible grit tempered inclusions in the Mississippian component are those sherds displaying trailing. However, the appearance of punctates on some of these sherds is evidence against this association.

The occupation period of the site by earlier non-Mississippian peoples is difficult to determine. A speculative date of ca. A.D. 200 can be assigned to at least some of the Middle Woodland ceramics. A date of ca. A.D. 100 to 200 for some of the material is also suggested by the presence of obsidian flakes at the site, a stone type probably introduced into the Middle West at this time in association with 'Hopewell' (Griffin, 1965:149). The date of the termination of Woodland occupancy cannot be determined from ceramics alone. However, the early Late Woodland Effigy Mound Culture probably terminated at varying periods in different regions of Wisconsin between A.D. 1000-1200.

Radiocarbon dates of A.D. 1420 ± 70 and A.D. 1630 ± 60 were determined for the Orr Phase materials. Mildred Wedel (1959:121) was the first to suggest that the Orr component at the Midway site is earlier in time than the Upper Iowa River sites, which contain historic materials. On the basis of inter-site ceramic design elements, Robert Hall suggested that the Midway component should have a date of ca. A.D. 1500 (1960:172-175). Supporting evidence for the approximate sixteenth century placement of the Orr Phase component at the Midway site is found in two site reports published in the ILLINOIS ARCHAEOLOGICAL SURVEY: "The Anker Site" and "The Oak Forest Site." The suggestion is proffered in the latter report that a greater percentage of plain rims (including the lip), an increased use of narrow lines, and a general simplification in design elements appears in the ceramic tradition related to the Orr Phase and to the Blue Island culture as the historic period is approached (Bluhm and Fenner, 1961:161). These suggestions are based upon a comparison of the ceramics recovered from the Anker site, which has an estimated age determination of A.D. 1400-1500 (Bluhm and Liss, 1961:135), and the Oak Forest site, which has an estimated date of ca. A.D. 1680 (Bluhm and Fenner, 1961:161).

Chi-square tests were conducted in shell tempered ceramic classes containing relatively large sample sizes. The null hypotheses that the samples composing

Classes I ($x^2 = 0.71$; df = 1), II ($x^2 = 4.76$; df = 3), V ($x^2 = 1.04$; df=4), VII ($x^2 = 5.41$; df = 2), IX ($x^2 = 0.021$; df = 1) are independent of the .01 level of significance were not accepted. These tests suggest, that there are no real differences between the proportions being compared in each of the above classes. The null hypothesis was accepted for Class VI. All of the above classes except IX have been rearranged (V) or contain one or more expected frequencies less than 5 (I, II, VI, VII). Chi-square computations for Class VI are recorded in Appendix B. The most markedly divergent classes (rim profile, shoulder design element, appendages, handle design elements) are also those classes containing very small samples.

A comparison of the range and frequency of lip, rim, and bodysherd thickness (Table 2) does not demonstrate any marked disconformities between the two areas. The samples are homogeneous in paste, surface finish, and general vessel form. A study of individual attributes and a limited number of Chi-square tests suggest, therefore, an interpretation of general homogeneity between the two ceramic assemblages. Pottery type distributions and the presence of pieces of particular jars in both areas corroborate a suggestion of essential homogeneity. However, the fragmentary nature of the remains could mask differences existing in any proportions dependent on whole or nearly complete vessels. What can be stated with some assurance is that the two ceramic samples demonstrate a greater degree of similarity between themselves than either does with any other component described in the archaeological literature.

Scraper groupings exhibit a general uniformity in size and shape between the two areas excavated. A possibility that must be considered is that some scrapers and other stone tools belong to earlier Woodland components. Evidence supporting an interpretation of general similarity between the two scraper samples is provided by two Chi-square tests. End scrapers were separated into: 1) specimens possessing proximal ends more than half of their maximum width; 2) specimens with or without pronounced bulbs of percussion. The null hypotheses that the proportions of scrapers in each class are dissimilar between Areas I and II were not accepted at the .01 level of significance ($x^2 = 1.05$ and 0.38 at df = 1).

The remaining chipped stone tools and the ground stone tools appear in such small quantities that their omission in one or the other area may be the result of sampling error. However, none of the tools differ from the expected lithic content of an Upper Mississippi, Orr Phase component. The omission of a number of expected implements should be mentioned. Flat stone mortars, hand mullers, stone celts, disc-shaped pipe bowls, [illegible]nt and biconical 'clubheads' are some of the artifacts previously recovered from the site. Whether these implements were found with burials or in trash pits is not recorded and, therefore, the significance of their omission is difficult to assess.

Although the sample size of most of the stone tools is too small to serve as a convincing indicator of the homogeneity or heterogeneity of the two areas excavated, a study of the horizontal and vertical distribution of utilized and un-

modified flakes is persuasive corroborating evidence of an essential intra-site homogeneity (Tables 39-40). Table 35 lists almost exact percentages of unmodified flakes of chert, red, yellow, and white quartzite, and quartz for the two areas. The possibility of this occurrence between dissimilar archaeological cultures would seem highly improbable. A study of Tables 39 and 40 also indicates that the vertical distribution of chert and quartzite proportions in each area remain essentially the same, with a general numerical decrease in each by descending levels. The use of quartzite in each area as a minority material in the composition of scrapers, knives, drills, and projectile points is also suggestive of the cultural homogeneity between the areas excavated.

Chi-square tests on two different samples of waste flakes produced different results. Waste flakes were separated in each area into: 1) chert, quartzite, and 'other'; 2) red, yellow, white and 'other' quartzite. The null hypothesis that samples from the two areas within the classifications are independent was accepted in the second case and rejected in the first ($x^2 = 3.31$; df = 2). This can be interpreted as conflicting evidence concerning the homogeneity of the waste flake samples from each area. A glance at the calculations involved in the determination of the former Chi-square value suggests, however, that the 'other' category contributes most numerically to the Chi-square value, while there is only a slight difference between the remaining categories. Chi-square computations for this test are recorded in Appendix B.

Economic Patterns

The occupational refuse from the Oneota component at the Midway site reflects an economic pattern characterized by hunting, fishing, gathering, and gardening. Domestic dogs may have been eaten. Abundant evidence of hunting is found in the large numbers of scrapers and in the projectile points. Robert Hall has hypothesized with the aid of an "end scraper index" that "the proportion of end scrapers relative to triangular points increases toward recent times and towards the Plains area" among components of the Oneota Aspect (1962:121-122). The "end scraper index," which is determined by multiplying the number of end scrapers divided by the number of triangular projectile points by one hundred, is 417.8 for the combined Midway site samples. Although this index seems disproportionately high in relation to some other Upper Mississippi sites (102.3 and 47.8 are recorded for the Lane and OReagan sites respectively), it does emphasize the abundance of end scrapers at the site as compared to Aztalan and to the 'transitional' Carcajou Point site. Only five end scrapers are recorded for Carcajou Point and two for Aztalan (IBID). This has been interpreted as evidence supporting an hypothesis of greater dependency upon hunting in the 'Classic' Oneota economic pattern as compared to the patterns apparent in a Middle Mississippi site (e.g. Aztalan) and in an early 'transitional' site (e.g. Carcajou Point).

The percentage of deer bone compared to ther mammal bone is exactly 88 per cent of the total at Cahokia, Aztalan and Carcajou Point, and 65.2 per cent at Lasley's Point, a Lake Winnebago Phase Oneota site (Cleland, 1965:3). Charles Cleland has interpreted the above percentages and the percentage of 36.2 per cent at the historic period Bell site (a non-Mississippian site) as indicative of an increasing emphasis upon smaller animals such as raccoons, muskrats, and beavers ca. A.D. 1200 and later (IBID). Since the quantity of faunal remains found at the Midway site is very small, it would probably be misleading to relate the percentages of animal species to the above hypothesis for comparative purposes.

The appearance of corn and beans in both areas of the site excavated is evidence for gardening, as well as additional evidence for the close similarity between the material content of the areas. Beans, which were available perhaps by A.D. 1000 in the Middle West, have been reported from the related Upper Iowa River sites and the Utz site (Yarnell, 1964: 110, 118-119; Wedel, 1959:35). Yarnell (1965) suggests that the shortage of nut remains from the Midway site may be explained by the presence of productive corn, bean, and, possibly, squash cultivation.

Length and pattern of occupancy of the Oneota component at the site is difficult to determine because of the small and differentially preserved sample. The Whistling Swan is a transient visitant of the area, primarily from March to April and from October to November (Gromme, 1963:13), but the single bone of the species is part of a tool and, therefore, possibly not indicative of spring or fall occupancy. The Wood Duck is a common summer visitant and the common Mallard is an abundant visitant during both summer and winter (IBID.: 14, 18). The value of the bird species as indicators of periods of site occupancy is diminished by their limited numbers. Each species is represented by a single specimen, which could be a stray individual captured at any time during the year.

Mature plum fruits are available from August to October, acorns from September to November, and hickory nuts in October (Yarnell, 1964:62, 68-70). All of these food plants were commonly stored, so their presence may represent more than just a fall occupancy (IBID.:75). This is also true for the cultivated plant foods, but the presence of the scapula hoe indicates that the site was probably occupied during the growing season too. Although many of the species of fish found in the refuse are considered game fish and difficult to capture (Harlan and Speaker, 1956:49, 51, 69), they could have been captured at any season of the year and, therefore, do not provide evidence of seasonal occupation.

The economic pattern of the Upper Iowa River complex of the Orr Phase sites conforms closely to the pattern depicted for the Midway site. Evidence of gardening is found in the presence of scapulae hoes, beans, and corn (Wedel, 1959:35). Large amounts of mammal, fish, and turtle bone, and of mollusk

shell, indicate that hunting and gathering were important aspects of the economic pattern (IBID.:35-36). Most of the larger mammals mentioned are also forest or forest-edge animals. However, numbers of bison bones at the Lane village site on the Upper Iowa River are suggestive of a greater orientation towards the prairie areas to the west and, possibly, of an increasing Plains influence in the later Upper Iowa River sites. Early historic records also affirm the Plains area influence that characterized the historic Ioway (Mott, 1938:241).

The concept of types of community patterning is an attempt to construct integrated models of socio-economic patterns as structural systems, in contrast to a description of an agglomeration of concepts of its constituent parts. Size of population and community pattern are difficult to determine from the features and refuse material at the Midway site. If the Oneota component does represent a short term occupation by a single community, it is probably representative of the primary type of community patterning termed 'Semi-Permanent Sedentary' by Beardsley et al . (1956:129-157).

External Relationships

Radiocarbon determinations for the Midway site indicate occupation by Oneota peoples approximately 500-700 years after the first emergence of this life-way (Barreis and Bryson, 1965). Clues as to the origin of the Oneota life-way cannot be expected from the Midway site. Elsewhere, the writer has suggested, that the Oneota cultures are most likely Woodland peoples acculturated to a Mississippian pattern involving significant agriculture, new ceramic styles, and other socio-cultural changes (Gibbon, 1969). In this 'acculturation' hypothesis early Oneota Phases (e.g. Koshkonong, Grand River) are considered 'Lake-Woods' ecotypes having an intense focus upon local riverine-lacustrine resources (e.g. fish, mollusks). A new type, the 'Grassland,' probably developed from the northern Lake-Woods Oneota ecotypes during the subsequent drying period which saw the expansion of the Prairie Peninsula. This new ecotype is commonly called "Classic" Oneota and is associated with the expanding Prairie Peninsula.

The Orr Phase is here interpreted as a regional Oneota Grassland ecotype adapted to the northern limits of the Upper Austral Biotic Zone in a prairie-forest setting along the Upper Mississippi River Valley. This prairie-forest province was an area of closed deciduous forests with oak savannas and prairies (Curtis, 1959). The terraces were covered in general with sparse growths of oak in a prairie setting as far north as St. Croix. In contrast the Uplands were heavily timbered.

"Life Zone" studies attempt to recognize environmental and ecological preferences of plant and animal species. Although life zones transcend the valley, and, therefore, do not differentiate between the animal life of the uplands and the valley bottoms, their study is of interest in relation to the geographical distribution of the Orr Phase as a unit. C. Hart Merriam divided the United States into three great regions, each characterized by particular associations of animals

and plants (1898). The three great regions–Boreal,Austral, and Tropical, were each subdivided into a number of minor belts or areas. A map depicting the extent of these zones, areas, and regions appears on the frontispiece of Merriam's report.

The Orr Phase cluster of sites is included within Merriam's Upper Austral Zone of an eastern humid or Carolian Area of the Austral Region. The northern boundary of the Upper Austral Zone is delimited by the isotherm showing a sum of normal positive temperature of 6,400°C, while its southern boundary coincides closely with the isotherm of 26°C for the six hottest weeks (IBID.: 55). More recent authors have attempted to refine the fringes of Merriam's life zones in their own specific geographical areas of interest. Hartley Jackson (1961), in Wisconsin, has retained the original terminology, but refined the geographical extent of the Upper Austral Zone, the Canadian Zone of the Boreal Region, and the Transition Zone between them. All Orr Phase sites in Wisconsin, Minnesota, and eastern Iowa are confined to the Upper Austral Zone, which hugs the Mississippi River as far north as St. Croix County. This is slightly north of the northernmost possible Orr phase site, Diamond Bluff. Other discussions of life zones also indicate that the sites comprising the Orr Phase (with the possible exception of the eighteenth century northwest Iowa sites) are confined to the northern fringes of a distinctive prairie-forest biotic province or life-zone generally designated the Upper Austral Zone or Province (Dice, 1938; Scott, 1942; Roberts, 1945; Buss and Mattison, 1955

The age determinations of the Midway site indicate that the site is earlier in time than the Upper Iowa River sites. The problem of the degree of relationship between them is, therefore, one that must be considered within the context of the implications of this temporal difference. Subsequently, two possibilities may be presented to explain the similarities between the two areas: 1) while the inhabitants of the Midway site were in some way related to the peoples who later populated the 'Iowa Orr Phase,' they were not involved directly in the cultural line that eventually moved into the Upper Iowa River; 2) the earlier culture represented at the Midway site eventually moved across the Mississippi River into Upper Iowa River Valley and a definite genetic connection existed between the two populations. If the latter alternative is correct, then the Midway and Upper Iowa River ceramics and other material items are representative of different time periods on a spectrum stretching through a limited time span.

Admittedly the Upper Iowa River Valley contains a multitude of sites from which the greatest amount of Orr Phase material has been recovered. But to designate it as the cultural 'heartland' of the Orr Phase on this basis alone may be a distortion of the actual circumstances. A survey of northwestern Illinois, southwestern Wisconsin, southeastern Minnesota, and northeastern Iowa would most likely demonstrate that the Orr Phase is a more widely spread phenomenon, exhibiting a greater range of variation, than is currently recorded (e.g. McKern, 1945:126). The heartland of the Orr Phase might more accurately be placed in

the general Upper Mississippi Valley south of St. Croix, with an earlier concentration in the tributaries to the east of the river and a later concentration in the western tributaries. Certain discrepancies between the two areas in ceramic motifs or projectile point measurements (e.g. Wedel, 1959:110), might be explained by this temporal difference and the predominance of quartzite on the east side of the river.

Keyes, who excavated many of the sites along the Upper Iowa River, was of the opinion that the sites near the mouth of the Upper Iowa River were older than the sites further up the stream (reported in Wedel, 1959:38). A westward movement across the Mississippi River is suggested by tradition (Mott, 1938: 241) and by the material content of the sites. The presence of historic trade goods among the Orr Phase sites along the Root River and its tributaries in Minnesota, and the similarity of the pottery from these sites with the proto-historic Upper Iowa River sites, supports this interpretation. If the inhabitants on the eastern side of the Mississippi River were forced across the river by pressure exerted by disrupted tribes moving through Wisconsin or Illinois, or for some as yet unknown reason, a greater concentration of sites would naturally occur as these people were funneled into the fewer and smaller western tributaries.

CONCLUSIONS

The Midway site is an eight-and-one half to eleven acre multi-component site situated on a terrace in the Gorge of the Upper Mississippi River. The gorge is within the Oak Subclimax of the North Central United States and the northern fringe of the Upper Austral Life Zone or Biotic Province. An Oneota Aspect component is dominant at the site, with at least one Middle Woodland and one early Late Woodland component present. The components are not stratified except in the burial ground.

The Oneota Aspect component is part of an early concentration of Orr Phase sites on the eastern side of the Mississippi River. Carbon –14 dating has resulted in age determinations of A.D. 1420 ± 70 (WIS-61) and A.D. 1630 ± 60 (WIS-79) for the component. Testing of two widely spaced areas on the site suggest that the component was the result of occupation by the same archaeological culture over a relatively brief period of time in the sixteenth century.

The occupational refuse from the Oneota component suggests an economic pattern characterized by hunting, fishing, gathering, gardening, and, possibly, by the inclusion of dogs in the diet. Food remains were too scanty to reconstruct the relative emphasis upon these differenct activities. If the component does represent a short term occupation by a single community, it is probably representative of the primary type of community patterning termed "Semi-Permanent Sedentary."

BIBLIOGRAPHY

Barreis, David A. 1953. The Blackhawk Village Site (Da 5), Dane County, Wisconsin. JOURNAL OF THE IOWA ARCHEOLOGICAL SOCIETY, Vol. 2, No. 4, pp. 5-20. McGregor.

Baerreis, David A. and Reid A. Bryson. 1965. Climatic Episodes and the Dating of the Mississippian Cultures. THE WISCONSIN ARCHEOLOGIST, Vol. 45, No. 4, pp. 203-220.

Beardsley, Richard, et al. 1956. Functional and Evolutionary Implications of Community Patterning In SEMINARS IN ARCHAEOLOGY: 1955. Edited by Robert Wauchope. Mem. Soc. Amer. Archaeol., No. 11. Salt Lake City.

Bluhm, Elaine A. and Gloria J. Fenner. 1961. The Oak Forest Site. In "Chicago Area Archaeology," edited by Elaine A. Bluhm, pp. 89-137. ILLINOIS ARCHAEOLOGICAL SURVEY, BULLETIN NO. 3, Urbana.

Buss, Irvin O. and Helmer Mattison. 1955. A Half Century of Change in Bird Populations of the Lower Chippewa River, Wisconsin, MILWAUKEE PUBLIC MUSEUM, PUBLICATIONS IN ORNITHOLOGY, No. 1.

Cleland, Charles E. 1965. Oneota Adaptations to the Environmental Resources of Prehistoric Wisconsin. Paper read at the 1965 meeting of the Society for American Archeology.

Curtis, John T. 1959. THE VEGETATION OF WISCONSIN. University of Wisconsin Press, Madison.

Dice, L.R. 1938. The Canadian Biotic Province with Special Reference to the Mammals. ECOLOGY, Vol. 19, No. 4, pp. 503-514.

Gibbon, Guy. 1966. The Midway Village Site: an intra-site analysis. M.S. thesis. University of Wisconsin. Madison.

Gibbon, Guy. 1969. The Walker-Hooper and Bornick Sites. Ph. D. thesis. University of Wisconsin, Madison.

Griffin, James B. 1943. THE FORT ANCIENT ASPECT. University of Michigan Press.

Griffin, James B. 1952. Some Early and Middle Woodland Pottery Types in Illinois. In HOPEWELLIAN Communities in Illinois. Edited by Thorne Deuel.

ILLINOIS STATE MUSEUM SCIENTIFIC PAPERS, Vol. 5, pp. 95-129.

Griffin, James B. 1960. A Hypothesis for the Prehistory of the Winnebago, pp. 809-865. In CULTURE IN HISTORY, edited by Stanley Diamond. Columbia University Press, N.Y.

Griffin, James B. 1961. Some Correlations of Climatic and Cultural Change in Eastern North American Prehistory. ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Vol. 95, Art. 1, pp. 710-717.

Griffin, James B. 1965. Hopewell and the Dark Black Glass. Papers in Honor of Emerson F. Greenman, THE MICHIGAN ARCHAEOLOGIST, Vol. 11, Nos. 3-4, pp. 115-155.

Gromme, Owen J. 1963. BIRDS OF WISCONSIN. Madison, Published for the Milwaukee Public Museum by the University of Wisconsin Press.

Hall, Robert L. 1960. The Carcajou Site (Fe2) and Oneota Development in Wisconsin. Doctoral dissertation, University of Wisconsin, Madison.

Hall, Robert L. 1962. THE ARCHEOLOGY OF CARCAJOU POINT: WITH AN INTERPRETATION OF THE DEVELOPMENT OF ONEOTA CULTURE IN WISCONSIN. 2 Vols. The University of Wisconsin Press, Madison.

Harlan, James R. and Everett Speaker. 1956. IOWA FISH AND FISHING. 3d ed. Des Moines, State Conservation Commission.

Henning, Dale R. 1961. Oneota Ceramics in Iowa. JOURNAL OF THE IOWA ARCHEOLOGICAL SOCIETY, Vol. 11, No. 2.

Hurley, William M. 1965. Archeological Research in the Projected Kickapoo Reservoir, Vernon County, Wisconsin. THE WISCONSIN ARCHEOLOGIST, Vol. 46, No. 1, pp. 1-114.

Jackson, Hartley H. 1961. MAMMALS OF WISCONSIN. Madison, University of Wisconsin Press.

Mc Kern, Will C. 1931. Wisconsin Pottery. AMERICAN ANTHROPOLOGIST, Vol. 33. No. 3, pp. 383-390.

Mc Kern, Will C. 1945. Preliminary Report on the Upper Mississippi Phase in Wisconsin. BULLETIN OF THE PUBLIC MUSEUM OF THE CITY OF

MILWAUKEE. Vol. 16, No. 3 pp. 109-285. Milwaukee.

Merriam, C. Hart. 1898. Life Zones and Crop Zones of the United States. U.S. DEPT' AGRIC., DIV. BIOL. SURV., Bull. 10.

Mott, Mildred. 1938. The Relation of Historic Indian Tribes to Archaeological Manifestations in Iowa. THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. 36, No. 3, pp. 227-314. Iowa City.

Roberts, T.S. 1945. The Vanished Mammals of Minnesota: a Retrospect. In. "The Mammals of Minnesota," edited by Gustav Swanson, T. Surber, T. S. Roberts. MINNESOTA DEPARTMENT OF CONSERVATION TECHNICAL BULLETIN NO. 2.

Scott, W. 1942. General Life Zones of Wisconsin Avifauna. In "Wisconsin Birds," edited by N.R. Barger, Bussewitz, Loyster, Robbins, Scott. WISCONSIN SOCIETY OF ORNITHOLOGY, Madison.

Wedel, Mildred. 1959. Oneota Sites on the Upper Iowa River. MISSOURI ARCHAEOLOGIST, Vol. 21, Nos. 2-4.

Yarnell, Richard A. 1964. Aboriginal Relationships Between Culture and Plant Life in the Upper Great Lakes Region. ANTHROPOLOGICAL PAPERS, No. 23, Museum of Anthropology, University of Michigan.

Yarnell, Richard A. 1965. Archaeological Plant Food Remains From Wisconsin. Unpublished Manuscript.

APPENDIX A: FEATURE DESCRIPTIONS

AREA I

FEATURE 1: Part of roughly circular, basin-shaped pit in SW corner of unit 1; the observed portion measured 38" from the S wall and 20" from the W wall; Feature 1 began 12" below the surface and had a depth of 18"; 10 fire burned rocks ranging in size from 4.8x4.6x6.3 cm. to 10.8x8.6x3.2 cm. were scattered through a concentration of charcoal, sherds, and shell; not completely excavated.

FEATURE 2: Part of roughly circular, basin-shaped pit in SE corner of unit 1; observed portion 30" in diameter on N-S line and 20" from E wall; the pit began immediately below plow zone (9") and had a depth of 13"; similar contents to feature 1 with 5 fire burned rocks ranging in size from 3.3x5.6x7.7 cm. to 4.5x5.5x8.1 cm.; not completely excavated.

FEATURE 3: Part of roughly elliptical, basin-shaped pit in NE corner of unit 1; observed portion 20" from north wall and 22" from E wall; pit began immediately below the plow zone (8") and had a depth of 15"; concentration of sherds, bone, and shell with 7 scattered fire burned rocks ranging in size from 2.1x3.7x4.0 cm. to 4.9x5.3x7.7 cm.; not completely excavated.

FEATURE 4: Irregular basin-shaped pit in center of unit 1; this pit was 34" long, 34" wide, and 19" in depth; the pit began 11" below the surface; concentration of charcoal, sherds, shell and 13 fire burned rocks ranging in size from 4.1x4.2x6.5 cm. to 4.2x5.0x7.9 cm.; a small concentration of shells in the center of the pit was apparently discarded together as refuse, for they were stacked back to back; the pit splayed irregularly at its base, measuring 10" N-S and 52" E-W; completely excavated.

FEATURE 5: Roughly elliptical, basin-shaped pit in N-W corner of unit 1; pit orifice measured 48" E-W and 28" N-S; the pit began 32" below the surface and had a depth of 8"; feature 5 contained a concentration of sherds, shell, bone and 27 fire burned rocks ranging in size from 2.4x4.3x6.6 cm. to 5.7x13.8x14.3 cm.; 19 of these rocks were clustered on the E side of the pit and 8 on the W; completely excavated.

FEATURE 6: An approximately circular, flat lenticular pit 2" thick in unit 3; the observed portion measure 14" from the N wall and 16" from the W wall; the pit began 14" below the surface and contained 1 fire burned rock measuring 4.3x4.7x8.8 cm.; like the other features so far described, this pit was probably a refuse concentration; not completely excavated.

FEATURE 7: A pit approximately circular in plan and flat lenticular in cross section in the SW corner of unit 5; the pit measure 5" in depth, 34" from the W wall, and 17" from the S wall; feature 7 began 17" below the surface and contained a concentration of charcoal, sherds, and shell; not completely excavated.

FEATURE 8: A pit approximately circular in plan and flat lenticular in cross section 19" below the surface in the SE corner of unit 5; the pit measured 22" from the E wall and 17" from the S wall; it had a depth of 5"; similar contents as other features, but like feature 7 no fire burned rocks; not completely excavated.

FEATURE 9: Concentration of mollusk shells 11" below the surface in center of unit 5; the feature was roughly elliptical in outline, 7" i n depth, and ovoid in cross section; it measured 36" E-W and 18" N-S; only a few flecks of charcoal and a few chert flakes were in association with it; completely excavated.

FEATURE 10: Comparatively large feature overlapping portions of units 6, 8 and 9; the large black area defining this feature began immediately below the surface and measured 44" in length (E-W), 48" in width (N-S), and 13" in depth; 26 scattered fire burned rocks ranging in size from 1.9x2.0x3.3 cm. to 6.9x13. 5x15.4 cm. were found; this feature was completely excavated, but not very productive in refuse material.

AREA II

FEATURE 11: A roughly elliptical pit with a fairly flat bottom was found 32" below the surface in the center of unit 14; a concentration of charcoal, sherds, seeds, and shell defined an area 26" N-S, 19" E-W, and 13" in depth; the pit contained 14 scattered fire burned rocks ranging in size from 2.0x3.1x4.0 cm. to 5.1x5.3x7.1 cm.; completely excavated.

FEATURE 12: unit 15; intrusive historic pig burial; no artifacts.

FEATURE 13: Badly eroded fragments of cranium, vertebrae, and one upper arm in unit 15; extremely eroded; disturbed by feature 12; no cultural material in association.

FEATURE 14: A pit roughly elliptical in outline and basin-shaped in vertical cross section found 14" below the surface in the north-central area of unit 19; the feature measured 18" E-W, 11" N-S, and 9" in depth; concentration of charcoal , sherds, and shell; 5 fire burned rocks ranged in size from 1.2x2.6x3.9 cm. to 2.4x3.3x6.1 cm.; completely excavated.

FEATURE 15: A pit approximately circular in outline and basin-shaped in vertical cross section 18" below the surface in the SE corner of unit 19; sherds, shell, and bone were concentrated in a blackened area 13" N-S, 12" E-W, and 13" in depth; no fire burned rocks; completely excavated.

APPENDIX B: CHI-SQUARE COMPUTATIONS

1. Chi-square test for the significance of the distribution of varieties of inner rim, upper edge design techniques (Class VI) between Areas I and II at the Midway site.

Area	technique 1 ob/ex	technique 2 ob/ex	technique 3 ob/ex	technique 4 ob/ex
I	4 / 10.6	8 / 4.9	2 / 4.4	32 / 26.1
II	20 / 13.4	3 / 6.1	8 / 5.6	27 / 32.9

$X^2 = 15.63$

df = 3

p at .01 = 11.345

Chi-square test for significance of the distribution of colors of quartzite (1. red, 2. yellow, 3. white, 4. 'other') between Areas I and II at the Midway site.

Area	color red ob/ex	color yellow ob/ex	color white ob/ex	color 'other' ob/ex
I	74 / 81.9	336 / 351.2	237 / 239.1	57 / 31.8
II	119 / 111.1	491 / 475.8	326 / 323.9	18 / 43.2

$X^2 = 37.2$

df = 3

p at .01 - 11.345

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SEED ANALYSIS IN ARCHEOLOGY 163
by Janet Doris Spector

THE ONEOTA COMPONENT AT THE PORTE DES MORTS SITE, DOOR COUNTY, WISCONSIN 191
by Carol Mason
University of Wisconsin-Green Bay

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SEED ANALYSIS IN ARCHEOLOGY

Janet Doris Spector

PREFACE

The seeds reported on in this study were recovered through water flotation and screening of soil samples collected during excavation of the Harvey site, Waukesha County, Wisconsin. Excavation of this site was conducted during the summer of 1968, under the auspices of the Wisconsin State Historical Society's highway salvage program. During the eight week field season, a crew of 8 students, under the direction of the author excavated an area of over 1,175 square feet to an average depth of 1.5' below the surface within the highway right-of-way established for the relocation of State Highway 15.

Analysis of the material remains recovered at the Harvey site was handicapped in that the site yielded only a small number of diagnostic artifacts, most of which were disturbed from their original provenience by modern plowing. Typological comparison of the ceramics and projectile points found with known local types indicated that the site was occupied by at least two different groups during the Woodland period. A more provocative complication in analysis of the Harvey site arose in the attempt to interpret the nature of the occupations at the site. The artifact inventory which was extremely small and typologically mixed, suggested that the site was never inhabited for prolonged periods of time. In contrast to this evidence however, was the presence at the site of 15 features which indicate rather intensive occupation. These features varied in outline and profile from small, shallow, regularly shaped basins, to rather large, deep ellipsoid pits. Functional interpretation on the basis of feature content was difficult. With the exception of three features (1 fire pit, 2 storage or refuse pits), the pits contained little other than charcoal flecks and occasionally scattered lithic debitage (see site report, Spector, 1970).

The most reasonable hypothesis concerning the site occupation in view of the somewhat conflicting evidence, is that the site was the location of some specialized activity which did not necessitate the use or manufacture of many lithic or ceramic implements but which did require features for either the storage or processing of some kind of resource. These resources or materials were either subsequently removed from the pits; too minute to be noticed during excavation, or perhaps, perishable. To carry this interpretation further, it might be suggested

that the site was visited, periodically, during the Woodland period by small groups exploiting locally available plant resources. Ethnographic accounts of historic Indians in the Midwest indicate that plants such as wild rice could be harvested and prepared without the use of lithic or ceramic artifacts. The threshing of wild rice, however, often required the construction and use of subsurface pits (Jenks, 1902). The Harvey site, situated along the bank of the Fox River and adjacent to a marsh would have been an ideal spot for the collection of vegetation. This hypothesis about the site, however, could be supported only if plant remains, such as seeds (which are too small to be observed during excavation) were present in the features. In fact, seeds were the only remains found in the soil samples taken from features at the site. Interpretation of these remains became the next problem faced in analysis of the site.

SEED ANALYSIS

Water flotation, a relatively new technique in archeology, has made possible the recovery of small floral and faunal remains which formerly went un-noticed during the routine excavation of sites. Vegetal remains, the only type present in the soil samples from the Harvey site, can potentially provide two kinds of information about a site: Ethnobotanical data relating to the economy, subsistence, and diet of prehistoric groups; and environmental information about the habitat in which the groups lived. If a site is stratified or if several sites in one area are being investigated, seeds can theoretically add a new dimension to our study and understanding of cultural and environmental change. In order to examine the specific nature of the information provided by vegetal remains recovered archeologically, seeds from a number of sites must be subjected to systematic analysis. The following represents one attempt to test the potential and limitations of seed analysis in archeology. The primary purpose of this study is to investigate the approach as it applies to wild plant remains found in the Midwest. Many other such studies must be undertaken before the value of this approach can be judged. Since the published material on the subject is so limited, the following report includes a summary of the techniques used to date for the recovery of seeds; a survey of several representative Midwestern studies in which seed analysis has been attempted; and a general discussion of the principles and problems involved in using the approach for cultural and environmental inference.

Until very recently the prevalent attitude among archeologists has been that plant remains, because of their perishable nature, are not usually present in archeological contexts (Meighan 1958:15). Those plant remains which have occasionally been recovered in the routine excavation of features, caves, etc. have generally been identified, tabulated and then presented with little interpretive comment in the appendices of site reports. In the Midwest, the paucity of vegetal

remains recovered archeologically has been clearly shown by Richard Yarnell (1964). Yarnell surveyed midwestern site reports in search of records of wild plant remains from Michigan, Wisconsin, Ontario, Ohio, northeast Illinois, northern Indiana, northwest Pennsylvania, western New York, and the northeastern edge of Minnesota. In a total of 59 sites, only 168 occurrences were recorded. This included various types of fruits, berries, nuts and tubers, with nuts, the most conspicuous plant remains, accounting for the majority of the occurrences. Yarnell's more recent summary of Wisconsin plant remains included in site reports adds data from 3 more sites (1966). Even with these additions, it is clear that the seeds reported do not reflect the vegetal remains which actually existed at the sites but rather the techniques used for the recovery of such material.

Elso Barghoorn, a botanist, published an article in AMERICAN ANTIQUITY in 1943, urging archeologists to become aware of the potentials of recovering seeds during excavations. He argued that plant remains can reveal the former vegetation of an area and help in understanding previously existing climates. However, he noted that ". . .in order that the greatest value may be obtained from a study of botanical materials. . .it is essential that certain precautions and techniques be used in collecting and preserving them. Unfortunately, much botanical information available in an archeological site is either discarded or overlooked in the process of digging and exposing the site" (Barghoorn 1943:289). It was not until the present decade, that such techniques were developed by archeologists, when it finally became evident that the assumption that plant remains are not often present in archeological contexts is a false one. Instead, the fact is, that because of their small size and fragile nature, plant remains, especially seeds, cannot be recovered by conventional field methods (Struever 1968:353).

In surveying the literature on this subject, two different techniques for seed recovery have been encountered. The most successful has been Stuart Struever's water flotation. The "water-separation" technique works on the principle that different substances have different porosities and therefore settle in water at different rates (Struever 1968). Thus, plant remains and small bones, because of their slow setting rates can be separated easily from heavier materials when soil samples are placed in water and the floating materials extracted. To further separate the plant remains from small bones, Struever recommends a chemical flotation process using a zinc chloride solution with a specific gravity of 1.62, in which the heavier bone will sink, while vegetal materials float. Watts and Winters in their analysis of plant "macrofossils" from a stratified lake bed in Minnesota used a similar water-separation method. Soil cores were taken from the site using a 3.8 cm. diameter Livingstone sampler. Core segments, 10 cm. long were individually scraped with a spatula to remove contamination and then stirred in water, where most samples broke up satisfactorily. They found that soaking in a hot solution of detergent in water helped to disaggregate cohesive sediments.

The disaggregated sediment is next washed with water jetted through no. 40 and no. 140-mesh screens. Residues from both screens are then set in shallow water on a white plate and examined with a low powered binocular microscope (Watts & Winters 1966:1341-1343).

A second technique for recovering seeds is that used by Richard Yarnell in his study of materials from the Feeheley and Juntunen sites in Michigan (Yarnell 1964:34). This technique involves the dry-screening of soil samples. Although Yarnell's discussion of procedures used is cursory, he does report that ". . .most of the larger plant remains were found by low power microscopic examination of samples of charcoal remaining after gross sifting in the field. Most of the smaller seeds were located by low-power microscopic examination of the mixed detritus that remained after fine sifting of cultural deposits in the laboratory" (Ibid). The dry screening technique has several limitations and is less satisfactory than water flotation. It is a time consuming operation and does not lend itself well to the processing of large samples; the mechanical abrasion can easily damage seeds; it separates material only by size, not by class; and finally, it cannot be used if the soil is at all cohesive since seeds will remain lodged in the matrix.

Four studies have been selected as representative of the ways in which seeds have been used to date for interpretive purposes in midwestern archeology. The most comprehensive use of vegetal remains encountered in the archeological literature was made by Richard Yarnell in his 1964 study of the "Aboriginal Relationships between Culture and Plant Life in the Upper Great Lakes Region." He concentrates on three major topics: The utilization of native plant products as determined from ethnographic records and the results of archeological research; aboriginal agriculture with respect to its historical aspects and the distribution of length of frostless season; and the effects of aboriginal activities on the natural flora and vegetation of the region (Yarnell 1964:iii). Perhaps the major contribution made by Yarnell in this study is his synthesis of known information about the plants utilized by historic Indians in the Great Lake region. His tables providing data on the use of plants, their season of availability and habitat preference and geographic range can be used as a basic reference for archeological interpretation of plant remains found at sites in the region. Archeologists, who have usually concluded that seeds recovered at sites represent the food resources of aboriginal inhabitants, will find Yarnell's work illuminating. He records that the historic Indians used plants in a number of ways other than food and that, depending on the specific purpose, various parts of the plant may have been utilized. This information should be considered before offering what may be rather naive conclusions about archeological plant remains, especially seeds.

Most relevant to the present report is Yarnell's analysis of seeds found after dry-screening cultural deposits at the Feeheley and Juntunen sites in Michigan. On the basis of his identifications, Yarnell suggests both ethnobotanical and environmental interpretations about the sites. Typical of the kind of conclusions

he draws is the following: "The season of availability of hickory nut, walnut, and butternut is October. For acorn, September-November, and for grape, August to autumn. Thus, it appears that the occupation or occupations of the site represented by the plant food resources took place in early autumn, if not other seasons" (Ibid.:26). He also makes use of seeds to suggest that one of the sites was well cleared at the time of occupation (Ibid.:40). At both sites, Yarnell employs ethnographic analogy to infer that various wild species found were used, prehistorically, for food. This method is useful only if applied with caution, as Yarnell is careful to point out (Ibid.:47). Most ethnographies in the Great Lakes region are based on research conducted in the 20th century. By that time, the Indians had been under the influence of whites for a considerable number of years. Many plants used for food, medicine, etc. by 20th century Indians may have been introduced by whites. Likewise, other plant resources used aboriginally, had been replaced by the products of white traders. Generally, Yarnell is conservative in drawing conclusions about the plant remains found. It is noteworthy that he always mentions the condition of the seeds, the material with which they were associated and the certainty of his identifications. This makes it possible to evaluate his conclusions. The major criticism of the seed analysis done by Yarnell is that he fails to discuss sampling procedures. No information is given concerning sample size, or how areas were selected to be sample. Thus, we have no way of judging whether the seeds found are representative of the native plant communities present at the sites or only those species culturally selected by the inhabitants.

Stuart Struever (1962) and Olaf Prufer (1965) have both used vegetal remains from Hopewellian sites as the basis of their hypotheses regarding the controversial subject of Hopewell subsistence. Both suggest on the basis of plant remains recovered, that the people were horticulturalists. After analysis of seeds from an Illinois Hopewell site, Struever postulates, as others had earlier, that there might have been a center of plant domestication in the eastern U.S. where local plant forms were cultivated prior to the diffusion into the area of the maize-bean-squash complex (Struever 1962:584-587). He uses as evidence the large number of Chenopodium seeds found at the Synders site and the context in which these were found. Seeds identified by Hugh Cutler as CHENOPODIUM SP. were found only in refuse pits (though we are not told what other areas were sampled), and were always associated with other plant foods such as hickory nuts, acorns and grasses. Struever believes this tends to support the hypothesis of Volney Jones, of an eastern agricultural complex of local plants ". . .including goosefoot or lamb's-quarter (CHENOPODIUM SP.), pigweed (AMARANTHUS SP.), giant ragweed (AMBROSIA TRIFIDA L.), sunflower (HELIANTHUS ANNUS L.), and marsh elder (IVA SP.) (Ibid:584). Struever is cautious in this support of the theory. Before such a suggestion can be accepted, he feels that many more plant remains must be recovered and methods designed whereby domesticated plants can be clearly distinguished from wild forms. It might also

be added that only if seeds can be determined to the species level can such an hypothesis be tested. Many variants of the genus Chenopodium, for example, were introduced to this country from Europe. Such species found archeologically, would indicate contamination, even if the seeds were found in features. This problem will be further discussed later in this report.

Olaf Prufer, in his analysis of the McGraw site in Ohio, is not as cautious in his conclusions as is Struever. Prufer suggests that this site was a Hopewellian farmstead and ". . .that the most important economic activity of the inhabitants seems to have been farming (Prufer 1965:136). This conclusion is in part based on the positive identification of one medium-sized, 12 row ear of corn and one distorted kernel. In spite of the fact that the wild plant remains recovered were more numerous than domesticates (44 pieces of walnut, 126 of hickory, 3 pieces of acorn, 37 fragments of hackberry, 2 fragments of plum), Prufer goes on to state the "collecting of wild plants was of least importance" in the economy of the Indians (Ibid). Prufer's use of plant remains found at the site is clearly inconsistent. His theory is further weakened by the fact that he fails to mention what techniques were used to recover plant remains. Although the presence of corn in Hopewellian contexts is of considerable importance in solving the question of Hopewell subsistence, poor techniques and mis-use of available evidence limits the value of his report.

The three studies so far discussed, generally represent the manner in which archeologists have used plant remains for interpretive purposes. Although it is now evident that small materials, such as seeds, are preserved in archeological contexts and can provide information about sites, no attempt has been made by archeologists to standardize procedures or outline the principles of using seed analysis for either ethnobotanical or environmental inference. Without such work, conclusions drawn will always be subject to question. Fortunately, paleoecologists are also interested in seed analysis. The most comprehensive study of the general principles and procedures of plant macrofossil (seed and fruit) analysis encountered in the present survey of the literature, is that by Watts and Winters (1966). Although, the major focus of their report is environmental, their findings have relevance for those interested in the approach for other interpretive purposes as well. For that reason a rather extensive summary of their research is presented here. Essentially, Watts and Winters were interested in comparing the results of seed analysis to those of pollen analysis.

The authors suggest three fundamental requirements necessary for productive macrofossil analysis: 1) Quantitative procedures must be used and presented clearly in any report. Frequency symbols such as "cc" (very common), and "r" (rare) are inadequate. Rather, frequencies must be related to the total number of seeds in a stated volume of sediments. 2) Large numbers of fossils should be collected to enhance the value of the quantitative approach. 3) The stratigraphic position of finds should be accurately related to a detailed pollen diagram (for archeology, we might add or related to other environmental data recovered).

The findings of Watts and Winters in their comparison of seed to pollen analysis can be summarized as follows:

1. The total pollen that falls on the surface of a site is referred to as the "pollen rain." Pollen counts are suitable for statistical treatment based on the practical assumption that pollen is randomly mixed in the pollen rain. Seeds also fall as a "seed rain" on various sites though they are not mixed as efficiently as pollen grains nor produced in so large a quantity. These differences, however, are only a matter of degree, not kind, and do not vitiate statistical analysis for interpretation.

2. Dispersal distance for seeds is more limited than for pollen. Therefore, the seed rain gives more information about local vegetation, whereas pollen analysis determines the nature of regional vegetation.

3. Both pollen and seed diagrams show "regional parallelism." That is, diagrams from one reasonably homogeneous vegetational unit are very similar. Therefore, if vegetation changes in response to a change in climate, seed rain changes at the same time pollen rain does.

4. The recurrence of macroflora sequences in different localities suggests that each major plant formation or community has a distinctive seed rain that reflects the abundance of each big seed producer.

5. There are difficulties using both pollen and seeds for environmental reconstruction. With pollen there are problems of certain species being transported over long distances and significant differences between plants which are wind-pollinated versus insect-pollinated. The problem of dispersal over long distances is not encountered in seed analysis, but seed analysis is complicated by the fact that heavy-seeded plants have much lower dispersal powers than light-seeded plants do. There is also the problem of differential production of seeds in annual and ephemeral plants compared to long-lived species. The former have a high production rate of small seeds; the latter have a low production rate of heavy seeds.

6. Seed statistics and pollen statistics have much the same kind of validity, and are subject to many of the same errors.

7. In general, pollen and seed analysis produce complementary, not contradictory results. Seeds tend to give a better (fuller) indication of the kinds of plant communities that were present at a given site.

8. Fossil seeds are usually determinable to species. Insect-pollinated species

with low counts in pollen diagrams may be common among the macrofossils. A rich macroflora, therefore, adds substantially to the information obtained from a pollen diagram.

9. Seed analysis may result in the reassessment of much pollen data recorded to date. Long distance transport of pollen often biases the pollen diagram, especially if local plants are low pollen producers.

10. Quantitative seed study becomes especially important in elaborating processes not apparent in a pollen diagram.

The Watts and Winters' study resulted in a number of findings relevant to the use of seed analysis in archeology. First, their work indicates that seeds found at sites can provide data on local environment. For the archeologist, this means that sampling in the field must be done with great care. In order to get a representative sample of the "seed rain," soil samples must be taken from areas all over the site and outside of the actual area of occupation. If this is not done, the seeds recovered may reflect only those species selected for use by the aboriginal inhabitants. Even if the investigator's main interest is in the subsistence or economy of the groups occupying a site, sampling should not be limited to features, as is often the case. Seeds found in features must be compared to those found in other areas of a site to ascertain if they occurred there naturally, as a part of the seed rain, or because they were used by the inhabitants. Secondly, for seed analysis to be meaningful, the results must be quantified. This procedure is critical for environmental interpretation since such information is available only if the plant community at a site can be reconstructed. These communities, which reflect local environmental conditions, are defined on the basis of the proportion of species present (Curtis 1959:3). Again, even if the major focus of a study is ethnobotanical, the quantitative approach is necessary. To state merely that certain species are present at a site, reveals nothing about the role they played in the subsistence-economy of prehistoric groups. Finally, it should be noted, that seeds, unlike pollen, can usually be determined to the species level. Plant communities can be defined only if the species present can be identified. Furthermore, seeds identified only to genus level, can easily bias cultural interpretations. Different species of a single genus can be either native or non-native. If the latter species are present in archeological contexts, contamination is indicated. This kind of information is unknown without species identification.

Archeologists interested in utilizing plant remains must consider a number of variables which are not especially important to the paleoecologists who work at non-habitation sites. The problem of selecting areas to be sampled has already been discussed. Poor sampling techniques can invalidate both cultural and environmental interpretation. After seeds have been recovered from a site and identified, the next problem confronting the archeologist is to determine what pro-

cesses might account for their presence there. These processes may be either natural or cultural. Plants are extremely portable and can be transported by man from distant areas. This can complicate environmental interpretation. Conversely, for ethnobotanical interpretation, many seeds recovered may be those of plants which flourish in the disturbed habitat created by man's presence at a site. To assume that these same plants were exploited by man simply on the basis of their presence at a site is an over-simplification. Environmental interpretation is also complicated by the fact that man both intentionally and unintentionally disturbs the native vegetation of an area. Many human activities such as disposal of waste, clearing of sites, burning areas, and collecting plants, all affect soil conditions and micro-environments at a site. To avoid mis-interpretation, these variables must be carefully considered, and sampling procedures should be designed to control them as much as possible. Non-human disturbance is another problem encountered in archeological sites. Rodents and other vermin are attracted to areas inhabited by man. Burrowing animals are especially relevant, since they often store various nuts and seeds in their sub-surface nests. Natural phenomena, such as flooding, can also be responsible for introducing foreign seeds to a site. Again, only carefully controlled sampling can help to avoid serious mis-interpretations.

The natural processes affecting the plant community at any site must be understood prior to drawing any inferences regarding climatic change on the basis of seeds recovered archeologically. Soils, water, temperature, light, atmospheric conditions, natural fires and the general biotic conditions all influence vegetation and are not of equal importance at any one time (Daubenmire 1959: 2-3). Each factor assumes increasingly greater importance whenever and wherever it begins to tax the ability of the organism either to tolerate it in greater intensity or to survive under lower intensity. Each species has a minimum and maximum tolerance for each of the various factors (Ibid). Clearly, these factors are all significant and variable at archeological sites and can be substantially altered by man's activities.

The above survey of the published material relating to seed analysis in archeology suggests several steps necessary for the successful application of the approach. First, sampling in the field must be done with great care to insure that a representative sample of the seeds present are collected. This should include testing within and outside of the area of habitation. Second, laboratory techniques should be employed which allow for maximum recovery of seeds from the soil samples. Third, seeds should be identified to the species level and quantified in order to reconstruct the native plant community and to check for contamination in the samples. Next, cultural and environmental inferences can be drawn. Finally, these interpretations should be compared to those based on other kinds of evidence recovered at a site. All of these steps should be discussed in the published report. Only if this is done, can the results of the seed analysis be evaluated and compared to findings at other sites. An attempt was made in analysis

of the seeds from the Harvey site to follow these steps. Unfortunately, there were no remains at the site which could be used to supplement or compare to the results of the seed analysis. Thus, the investigation was more useful as a study of the methods and problems of seed analysis that as a procedure which yielded conclusive information about the site.

SAMPLING PROCEDURES

A basic pre-requisite for meaningful seed analysis is adequate sampling procedures in the field. At the Harvey site, soil samples were taken at various loci in each feature, placed in plastic bags appropriately labelled and transported to the laboratory for processing. In addition to sampling features, soil samples were also taken from each of four test columns. Two of these were located within the site proper, and two were located south of the occupation zone, toward the Fox River where there was no evidence of aboriginal activity or modern plowing (Map 1). Each test column was excavated down to water table and soil samples were collected at 0.2' intervals. As has been mentioned, it is vital to sample areas outside the site. There is no other way to determine if the seeds recovered within the site are a part of the native vegetation of the area or only those selected for use by the inhabitants or a mixture of the two. It is also necessary to sample areas other than features within the site to enhance cultural and environmental interpretations. One of the major criticisms of the published archeological reports that include seed analyses is the failure of investigators to provide information on sampling procedures. Stuart Struever, for example, bases some of his conclusions of the presence of Chenopodium seeds in features (Struever 1962). Unfortunately, he does not report what areas of the site had been sampled. At the Harvey site Chenopodium seeds were also found in comparatively large numbers in the features. However, these seeds were also present in large quantity, in the test columns inside and outside of the site. The argument that seeds found heavily concentrated in features reflect food supplies of the inhabitants loses its persuasion if the same seeds are found in equally high proportion in other areas tested, particularly if they are found in samples taken outside of the immediate area of occupation.

Two recommendations with regard to sampling in the field can be suggested on the basis of work done at the Harvey site. First, in testing outside of the site, it is necessary to take samples from a number of different locations. The samples taken from the test columns near the Fox River represented only one microenvironment near the site and it appears, as will be shown, that the area may have been disturbed by human activity even though this was not apparent during excavation. Secondly, a collection of the modern flora should be taken while in the field. This could be helpful in identifying seeds found archeologically and could also provide some comparative information concerning past and present environmental conditions at the site.

LABORATORY TECHNIQUES FOR SEED RECOVERY

One-liter samples from each feature and from each 0.2' level of one test column outside and one inside the site were processed in the laboratory. The sample size was arbitrarily chosen after several samples had been tested and it was found that this unit produced a fairly large number of seeds. Sample size is obviously to be determined by the nature of the material at any particular site. Use of a standard sample size is not demanded in seed analysis. The number of seeds per unit will vary depending on the area from which the soil samples were taken and it may be necessary to process different volumes of sediment for different samples in order to recover a significant number of seeds. If this is done, it is critical that seed frequencies be related to the total number of seeds in a stated volume of sediment in the published report.

The major concern in processing soil samples should be to recover enough seeds so that the proportions of different species will be reflected. Seeds from the Harvey site were extracted from soil samples using Stuart Struever's water-separation and chemical flotation techniques with minor modifications. Although Struever suggests processing samples in the field, all of the flotation in the present study was done in the laboratory. It was felt that greater control of the material could be maintained in a laboratory setting where the chances of contamination and seed loss are minimized.

Initially, each one liter sample was placed in a container which was then filled with water. Seeds which floated to the surface were poured into fine-mesh crinoline. More water was added and the solution gently stirred until material no longer floated to the top of the container. The residue left after this process was completed, when necessary, was boiled in a sodium bicarbonate solution to disaggregate cohesive sediments and thereby release any seeds which may have been lodged in the matrix. Each sample was then washed through a no. 40-mesh screen, which is fine enough to prevent the loss of any seeds. Larger material, such as pebbles can be separated out by placing a larger-mesh screen on top of the no. 40 screen. Seeds which had floated up initially, and those recovered in the water screening process were carefully extracted with a small artists' brush. using a low-powered binocular microscope to scan the residue of each sample. The seeds were then placed in appropriately labelled glass vials.

Chemical flotation was employed in processing some samples. The purpose here was to see if this technique would be an expedient way to separate seeds from the silty residue which remained after flotation and screening. Struever had used this technique to separate bones and seeds. Residues containing both floral and faunal material were placed in a zinc chloride solution which has a specific gravity of 1.62, in which the light plant remains float while the heavier bone is suspended at a lower level and silt sinks to the bottom (Struever 1968: 355-357). With the Harvey site material, since there were no bones, the technique was used to separate seeds from silt. To test the method, two liters of soil

from the 0.4-0.6' level of TPB (test pit B) were processed, one using chemical flotation and one just water flotation and screening. The results can be seen in Table 6. It will be noted that chemical flotation allowed for the recovery of many more seeds than the water-flotation and screening process. However, the proportions of various species were not substantially different in the samples processed. Only in the case of the minute seed type, CAPSELLA BURSA-PASTORI, did the chemically processed sample differ from the other. In TPC (test pit C), several samples were again subjected to chemical flotation after water flotation and screening. In these samples no additional seeds were recovered through the use of the chemical procedure. Generally, in samples where the silt is fine enough to pass through the no. 40-mesh screen, the technique of chemical flotation does not affect the proportion of seeds recovered. For each different site the success or necessity of chemical flotation will vary depending on the nature of the soil. It is advisable to at least experiment with the chemical process to see if it is worthwhile for separating seeds from silt. The solution is made by mixing two pounds of granular zinc chloride in one quart of water. It can be used several times and should be stored in acid resistant containers. Since the solution is extremely caustic, the chemical flotation procedure must be used with great care.

SEED IDENTIFICATION

The value of seed analysis is greatly dependent upon the accuracy of the identifications made. Ideally, someone familiar with seed taxonomy should be responsible for identifications made of archeological specimens. However, such specialists are not often available for this work and for an approach to be of general applicability in archeology, the archeologist must, of necessity, attempt to acquire skills normally outside of his immediate field. Seed identification can be undertaken by the archeologist if a reference collection is available and if his identifications can at least be checked by specialists in the field of seed taxonomy.

The initial process of separating seeds into distinguishable groups is neither difficult nor time consuming. The most useful characteristics for this preliminary separation are size, shape, coloring and peculiarities of the outer surface of the seeds (Martin and Barkley 1961:5). Seeds from the Harvey site were separated into types by examining each specimen under low-power magnification and placing those seeds sharing similar characteristics of external morphology into small vials. These were then compared to the seeds illustrated in the Martin and Barkley seed identification manual, and tentatively identified to the genus level. Next the seeds were compared to the reference collection in the seed laboratory of the State Department of Agriculture, and when possible, identified to the species level. All identifications were checked by Mr. Russell Marx, director of

the State seed lab. As a further control, seeds also compared to the collection of the University of Wisconsin, Department of Botany.

The archeologist employing seed analysis is confronted with several problems with regard to plant identification of the basis of seeds only. Identifications would be much more secure if other parts of the plant were also present in archeological contexts since in some cases the seeds of different species are almost indistinguishable. Another problem for the archeologist is that species determination for some plants is possible only by studying the internal morphology of the seed. Unfortunately, archeological specimens are unlikely to have internal structure intact. Seeds of different genera may be very similar in external morphology and can be identified only on the basis of internal characteristics (Martin and Barkley 1961:6). These problems are somewhat balanced by the fact that many plants can be identified to the species level on the basis of external morphology of the seed. The identifications made of the Harvey site specimens are presented in Tables 5-7. It should be noted that not all seeds could be determined to the species level. Those which could not be so identified are of limited value for either environmental or ethnobotanical interpretation.

Prior to reconstructing the plant community represented at the site for environmental interpretations or utilizing the identifications for ethnobotanical inference it is useful to ascertain the ranges and habitats of the species present. Such information is available in GRAY'S MANUAL OF BOTANY (Fernald 1950). All of the species present at the Harvey site are found in the area today.

Table 5. Seeds from Features - WK 236
(1-liter samples)

	F-1	F-2	F-3	F-5A	F-5	F-6	F-7	F-8	F-9	F-11	F-13	F-14
CHENOPODIACEAE												
Chenopodium album		9	28	4	28	25	5	1	11	2	7	13
C. hybridum gigantospernum		1			13	2	1	1	1			
PORTULACEAE												
Portulaca oleracea	3					4						5
CARYOPHYLLACEAE												
Lychnis alba	1			1	3	1	1				1	
POLYGONACEAE												
Rumex acetoseila												
Polygonum erectum			1								3	
P. convolvulus			1		1							
Polygonum sp.												
ERICACEAE												
Vaccinium sp.			4									
OXALIDACEAE												
Oxalis stricta			1		1							
GRAMINAE												
Setaria sp.			1			1			2			
Panicum sp.		1	1						1	3	2	1
Unknown sp.	1					5						
CRUCIFERACE												
Capsella bursa-pastori									2			
ROSACEAE												
Rubus occidentalis	2		6	1	103	5		1	1		5	2
AMARANTHACEAE												
Amaranthus retroflexus					3	9					4	
JUGLANDACEAE												
Carya sp.*			11									
UNIDENTIFIABLE			2	1								1
Totals:	7	11	58	7	152	52	8	4	18	5	22	22

*fragments only (hickory nut)

Table 6. Seeds from TPB - WK 236
(1-liter samples)

	0.0-0.2'	0.2-0.4'	0.4-0.6'	0.4-0.6' (c)	0.6-0.8'	0.8-1.0'	1.0-1.2'	1.2-1.4'	1.4-1.6'	1.6-1.8'	1.8-2.0'	2.0-2.2'	2.2-2.4'	2.4-2.6'
ENOPODIACEAE														
enopodium album	52	130	104	199	57	11	2	1	1	1			1	1
hybridum gig-antospernum	2	4												
RTULACACEAE														
rtulaca oleracea	8	10	4	7	1	1						1	12	
RYOPHYLLACEAE														
chnis alba	23	42	42	70	14			1	1					1
LYGONACEAE														
mex acetoseila				5										
lygonum erectum					1									
careyi		1	10	3										
convolvulus	2	3	3		2									
Pennsylvanicum		1	2	4	2									
LANACEAE														
ysalis hetero-phylla		2		1										
ICACEAE														
ccinium sp.	1		2	1										
ALIDACEAE														
alis stricta	3	2	2	2										
PHORBIACEAE														
alpha virginica	24	115	61	77	15	3	5	3			8		3	6
AMINAE														
taria sp.														
nicum sp.	2	5	1									1	1	
known sp.	2		1	1	1									
UCIFERACAE														
psella bursa-pastori	5	65	3	136										1
SACEAE														
bus occidentalis		2		2	1									
ARANTHACEAE														
aranthus retro-flexus	17	34	22	33	22	2								
RBENACEAE														
rbena sp.				1										
IDENTIFIABLE	6	4	3	2		3		1			1			
TALS:	145	390	260	544	116	20	7	6	2	1	9	2	17	9

Table 7. Seeds from TPC - WK 236
(1-liter samples)

	0.0-0.2'	0.2-0.4'	0.4-0.6'	0.6-0.8'	0.8-1.0'	1.0-1.2'	1.2-1.4'	1.4-1.6'	1.6-1.8'	1.8-2.0'	2.0-2.2'	2.2-2.4'
CHENOPODIACEAE												
Chenopodium album	139	172	189	214	24		4	1		1		
C. hybridum gigantospernum	2	1										
PORTULACACEAE												
Portulaca oleracea	120	64	49	78	1	1	1					
CARYOPHYLLACEAE												
Lychnis alba	87	80	65	86	8		1			1	1	
POLYGONACEAE												
Rumex acetoseila	1											
Polygonum careyi	9	5		10	1							
P. convolvulus	11	8	6	14								
P. pennsylvanicum	12		26	54								
SOLANACEAE												
Physalis heterophylla	11	9	3									
ERICACEAE												
Vaccinium sp.	7	10	2	5								
OXALIDACEAE												
Oxalis stricta	1	1	2	1	2		1					2
EUPHORBIACEAE												
Alcalpha virginica												
GRAMINAE												
Setaria sp.	67	62	32	44	10		1					
Panicum sp.	32	19	19	17	3		1					
Unknown sp.	1		1	4	3							
CRUCIFERAE												
Capsella bursa-pastori		52	7									
ROSACEAE												
Rubus occidentalis	2			2	1							
AMARANTHACEAE												
Amaranthus retroflexus	89	109	77	64	2							
LEGUMINOSAE												
Medicao lupulina	12	2				1	1					
COMPOSITAE												
Ambrosia sp.	1	1	3									
UNIDENTIFIABLE	3	11	1	4		1						
TOTALS:	607	606	482	597	55	3	9	1	0	2	1	2

It is significant, however, that many of the species are not native to the United States. Information concerning the habitat of each species found at the site is presented below.

NON–NATIVE SPECIES

CHENOPODIUM ALBUM (Pigweed, lambsquarter)-weed of cultivated and waste ground; naturalized from Europe (Fernald 1950:594).

PORTULACA OLERACEA (Pursland)-Cultivated and waste ground; naturalized from Europe (Ibid.:608).

MEDICAGO LUPULINA (Black Medick)-Roadsides and waste places; naturalixed from Europe (Ibid.:895).

CAPSELLA BURSA-PASTORI (Shepherd's pouch)-Weed of cultivated and roadsides, cultivated ground etc.; naturalized from Europe (Ibid.:704).

LYCHNIS ALBA (White cockle, campion)-Roadsides, borders of fields and waste places; naturalized from Eurasia (Ibid.:630).

POLYGONUM CONVOLVULUS (Black bindweed)-Weed of cultivated and waste ground; naturalized from Europe (Ibid.:588).

RUMEX ACETOSEILA (Sheep sorrel)-Ubiguitous weed of worn-out fields or sour soils; naturalized from Europe (Ibid.:571).

NATIVE SPECIES

CHENOPODIUM HUBRIDUM GIGANTOSPERNUM (Maple leafed goose foot)-Rocky woods, thickets, clearing and waste places (Ibid.:594).

POLYGONUM PENNSYLVANICUM (Pinkweed)-damp shores, thickets, clearings and disturbed or cultivated ground (Ibid.:581).

POLYGONUM CAREYI-low thickets, swamps, recent burns, clearings and cultivated ground (Ibid.:584).

POLYGONUM ERECTUM-disturbed soil, waste places (Ibid.:579).

AMARANTHUS RETROFLEXUS-(Wild beet, pigweed)-waste or cultivated ground, semicosmopolitan weed (Ibid.:603).

RUBUS OCCIDENTALIS (Black Raspberry)-Rich thickets, ravines and borders of woods (Ibid.:822).

OXALIS STRICTA (Wood sorrel)-dry, open soil (Ibid.:944).

ACALPHA VIRGINICA (Copperleaf)-dry soils (Ibid.:961).

PHYSALIS HETEROPHYLLA (Ground cherry)-dry open woods, clearings, (Ibid.:1258).

The presence of non-native species in the plow zone and the humus of Test Pits B and C is to be expected since the seeds there represent the modern flora at the site. However, the occurrence of such seeds, those either directly or indirectly introduced to the U.S. by man, in the features and below plow and humus levles in test columns is suspicious.

	Features	TPB (below plow & humus)	TPC (below plow & humus)
Non-native Species			
Chenopodium album	133	7	6
Portulaca oleracea	12	13	2
Capsella bursa-pastori	2	1	
Lychnis alba	8		
Rumex acetoseila	1		
Medicago lupulina			2
Totals:	159	24	13
Native Species			
Chenopodium hybridum gigantospernum	10	2	
Amaranthus retroflexus	18		
Rubus occidentalis	123		
Oxalis stricta	2		3
Acalpha virginica		25	
Totals:	162	27	3

There are three possible explanations to account for the presence of the non-native species in these contexts. First, it may be that the species determinations are inaccurate, and that in fact, the seeds identified as non-native are either indistinguishable from related native species, or simply incorrectly identified. However, since the seeds from the Harvey site were carefully compared to two reference collections and all identifications checked by a specialist in seed identification, it seems more reasonable to seek another explanation for the presence of

the non-native species. One possibility is that Botanists have erred in designating these species as non-native. The supposedly non-native CHENOPODIUM ALBUM found in large numbers at the Harvey site is particularly relevant here. Yarnell, who found this species at the Juntunen site at a depth of about 8 inches, reports that although the species is generally thought to have been naturalized from Europe, it is probably also native to Alberta, Canada (Yarnell 1964:41). If this is so, then its wide distribution throughout the Midwest might be due to the fact that it was frequently used by Indians for food and spread through the area by them. Although this explanation may be adequate for the controversial CHENOPODIUM ALBUM, it would be unlikely that the Botanists were also mistaken about the origin of the five other species (non-native) found in the features and the lower levels of TPB and TPC. Probably the most plausible explanation is that the seeds identified as non-native are in fact, recent seeds and that the soil samples from the features and the test pits were contaminated.

The problem of contamination or disturbance is frequently encountered at sites by archeologists. As has been mentioned, when attempting to use seeds found archeologically, the various mechanisms which could account for the presence of the plant remains must be considered carefully and critically. At the Harvey site, much of the occupation zone was disturbed by modern plowing. It is feasible that recent seeds could have become mixed into the features after many years of cultivation, even though soil samples were intentionally taken from the lower depths of features to avoid such contamination. Plowing, however, could not account for the presence of non-native plant remains from the deeper zones of the test columns. A more likely source of this contamination is the activity of small animals which live in soils, such as earthworms, insects, spiders, crustaceans, etc. The effects of such animals could easily escape notice during excavation in contrast to the obvious signs of rodent disturbance which can be avoided in sampling. In cultivated soils, earthworms are known to burrow two to three feet below the surface. "Incidental to carrying organic matter to deep horizons. . .they leave tunnels behind them that facilitate movement of water through soils. . ." (Thorp 1967:192). Small seeds could easily move to considerable depths through these tunnels. Likewise, ants also move materials in soils through their tunnelling operations and reportedly store masses of seeds in the sub-surface "bins" of anthills (Ibid.:199). A further source of contamination, especially in southeastern Wisconsin would be soil disturbance caused by natural phenomena such as annual freezing and thawing which could produce cracks in the earth through which seeds could filter downward from the upper levels of the site.

The problem of contamination limits the kinds of interpretations which can be made on the basis of seeds from the Harvey site. One solution to the problem would be establishing a method whereby the intrusive, recent seeds could be distinguished from those which were actually associated with earlier deposits. In some cases, the condition of the seeds might be such that the two types could

be separated. It might be expected that seeds found in features would be charred or somehow altered after remaining in the earth for a prolonged period of time. At the Harvey site, unfortunately, only the hickory nut fragments, the black raspberry seeds and a few of the unidentifiable seeds were conspicuously altered (charred). Most of the seeds were in extremely good condition and showed little sign of alteration.

The problem of disturbance has been a recurrent one at the Harvey site, both with respect to the cultural remains and the seeds. Reconstruction of the native plant community demands that samples be taken from undisturbed areas where the natural seed rain would be represented. If, in such areas soil samples have been taken at various depths in vertical columns, stratigraphic changes in the plant community can ideally, provide data on environmental change. At a stratified site, this information could be of great value in interpreting culture change. At the Harvey site, the vertical columns both inside and outside the immediate area of occupation were sampled at 0.2' intervals. Although there was no cultural stratigraphy at the site, the column samples could be used to test the potential of seed analysis as an indicator of environmental change. Every plant community is characterized by a particular structure and appearance imparted by the numerical proportions of the species which compose it. All species have certain limits to environmental variables and those with similar limits tend to go together (Curtis 1959:3). Thus, if changes in the proportion of various soecies are noted in a stratigraphic column, environmental change is indicated. Unfortunately, the soil samples at the Harvey site, appear to have been contaminated by the movement of recent seeds from the upper levels to the lower levels of the test columns. Consequently, even as a test of some of the potential of seed analysis, the stratigraphic samples were of little value.

Taken as a whole, the sample of seeds from the Harvey site does little more than substantiate the conclusion that the site was disturbed. John Curtis, in his The VEGETATION OF WISCONSIN, compiled and synthesized all of the ecological information on Wisconsin plant communities available as of 1959. 34 types of plant communities are defined by Curtis on the basis of species composition. Most important in these communities are those species which are dominant, i.e. those well adapted to the climate and soil groups of an area. These in turn, exert a controlling influence on the communities where they occur either because of their size or their high population density. Generally, the dominant species are trees. The interaction of the dominant species with general climate and regional soil groups produce a series of microenvironments which differ according to the biological characteristics of the dominants concerned (Curtis 1959:47-52). Most of the remaining species must grow in these modified conditions and they tend to be sorted out in groups aligned with the particular dominants. A comparison of the complex of plant remains found at the Harvey site with the type of species prevalent in the various communities defined by Curtis, results in the conclusion that most of the seeds are from those plants common in Wisconsin

weed communities (Ibid.:591-592).

When a disturbed site is relieved from the disturbing agents and allowed to develop by itself, a secondary succession of plants is initiated. The pioneer species adapted to the disturbed conditions are generally called weeds. Weeds, as a plant type, have been only loosely defined but such plants do share certain characteristics. They are plants which are very vigorous; can withstand and surmount high intra-specific competition; have great tolerance of soil disturbance; and generally possess a high reproductive potential. The seeds of such plants germinate under extreme fluctuations of soil temperature and seedlings are tolerant of extreme fluctuations of soil temperature and soil moisture typical of open, disturbed sites (Ibid.:416). Prevalent species of weed communities in southern Wisconsin, present in the samples from the Harvey site include: AMARANTHUS RETROFLEXUS, CAPSELLA BURSA-PASTORI, CHENOPODIUM ALBUM, LYCHNIS ALBA, OCALIS STRICTA, POLYGONUM CONVOLVULUS, POLYGONUM PENNSYLVANICUM, PORTULACA OLERACEA, and MEDICAGO LUPULINA (Ibid.:591-592). In addition to these, RUMEX ACETOSEILA, CHENOPODIUM HYBRIDUM GIGANTOSPERNUM, POLYGONUM CAREYI, and POLYGONUM ERECTUM are also plants which thrive in disturbed habitats.

Both aboriginal activity and modern farming would account for the disturbance of the native plant community at the Harvey site. This explains the presence of weed seeds in the soil samples taken within the site. Those seeds found in the features may be from plants which invaded the site during aboriginal occupation or after the site was abandoned, since the disturbed conditions would provide an excellent habitat for weed species. Apparently the area tested south of the site was not free from disturbance, judging from the seeds recovered since the species present are again those typical of disturbed sites. The fact that the samples from the lower levels of the test column in this area appear to have been contaminated with seeds from the upper levels, and that the area tested appears to have been disturbed, precluded the possibility of reconstructing the native plant community at the Harvey site. As a consequence of these problems environmental interpretations could not be made on the basis of the seeds recovered.

The seeds from the features do give some information about the possible cultural activities undertaken by the inhabitants of the site. Charred black raspberry seeds (RUBUS OCCIDENTALIS) were found in seven of the twelve features at the site. In feature 5, 103 such seeds were found in a 1-liter sample. Black raspberry is a plant native to the area, which grows in rich thickets, ravines and the borders of woods (Fernald 1950:822). The high frequency of this type of plant in the features, especially when compared to the low frequency of the species in the test columns, suggests the aboriginal inhabitants collected the plant for some purpose. Yarnell reports that several Historic tribes including the Objibwa, Menomini, Sauk, Fox and Iroquois collected the berries of this plant and used them

for both food and medicine (Yarnell 1964:58). Black raspberries are available from July—August, suggesting that the site was occupied during the summer, if not at other times of the year. Another seed type found in large numbers in the features, is CHENOPODIUM ALBUM. Again there are records of this plant being used by Historic Indians. Chenopodium seeds were collected by the Ojibwa, while the greens of the plant were used by the Ojibwa, Potawatami, and Iroquois (Ibid.:55). The conclusion that Chenopodium was intentionally collected and utilized by the inhabitants of the Harvey site is, however, unwarranged. It will be noted that CHENOPODIUM ALBUM was found in large numbers in both of the test columns. This plant, which produces many seeds, grows prolifically in disturbed habitats. The high frequency of the seeds in both the features and test columns indicates that it was probably just one of many weeds which flourished in the disturbed soils of the site. Since the seeds in the features showed no signs of alteration there is no reason to assume that they were exploited by the prehistoric inhabitants of the site. The burned hickory nut fragments found in Feature 3, undoubtedly represent a food source of the Indians at the site although it is doubtful that the Indians came to the Harvey site specifically to collect this resource, since the remains of hickory are not present in large numbers.

The artifact inventory and features at the Harvey site suggested that the original occupants of the site may have come to the area to collect some natural resources. This hypothesis can be neither confirmed nor rejected on the basis of the seed analysis. Seeds were recovered from most of the features, but with the exception of the black raspberry and Chenopods, they were not found in large numbers. If the inhabitants did come to the site to collect plants, very few remains were left behind in the features. The seed analysis was also unproductive at this site for environmental interpretation, largely due to the fact that the soil samples came from contexts in which the native plant community was disturbed and replaced by pioneer weed species.

COMPARISONS

Contamination of soil samples was a serious impediment to interpretation based on seeds at the Harvey site. Seeds from three additional sites were identified in an attempt to discover if contamination is a fairly pervasive phenomena or if it was one specific to the Harvey site. The criterion for determining contamination was the presence or absence of non-native species in samples taken below the plow zone or humus. Two of the sites chosen for this investigation are located in Iowa. Rock Run Shelter (13CD10), was excavated during the summer of 1967 by Robert Alex of the University of Wisconsin. The site, a stratified Woodland Rockshelter, is located in Cedar County, Iowa. Soil samples were subjected to water flotation and water screening and the seeds were abstracted

from the residues by Mr. Alex. Another Iowa site, the A.C. Banks site (13PM40), was tested by Dr. David Baerreis during the summers of 1967 and 1968. Soil samples at this site were taken in columns at two inch intervals to a depth of over 140 inches. Dr. Baerreis' major interest was in investigating the potentialities of gastropod analysis in the study of minor climatic episodes that are involved in the span of time of the late prehistoric period (Baerreis 1969:2). Seeds found in the floated soil samples were separated from the residue by Dr. Baerreis and identified by myself (as were those of all three of these sites). The third site considered in the present study is Aztalan, a Mississippian village site located in Jefferson County, Wisconsin. Soil samples were collected from features at this site by Mr. Manfred Jaehnig of the University of Wisconsin during excavations conducted in the summer of 1967 by the State Historical Society of Wisconsin. Seeds were extracted and identified from the residues of floated soil samples from five features at the site.

The results of the study of these three sites are interesting though not meant to be conclusive (see Tables 8, 9, 10). The samples collected from the two stratified sites in Iowa appear to be free from contaminants. At both sites, CHENOPODIUM ALBUM was present in the upper inches while in the lower levels only the native Chenopodium species were found. This suggests that seeds did not filter downward from the upper levels of the sites as was the case at the Harvey site. At the A.C. Banks site, where seeds other than Chenopodium were recovered, none of the species identified from the lower levels of the site were non-native, although many of the specimens could not be identified due to the fragmentary nature of the seeds. In contrast to the two stratified sites, are the samples from Aztalan. The features at that site are located just below the plow zone. Four of the five features tested in this study, contained non-native species (see p. 40) and if we assume that CHENOPODIUM ALBUM is non-native, all five of the features were contaminated with recent seeds. It might be tentatively suggested on the basis of the Harvey site as well as the three other sites investigated, that contamination is most likely in shallow sites where the occupation zones are directly below a plowed surface. Furthermore, since non-native species were not present in the lower levels of the two stratified Iowa sites, it may be that contamination of the Harvey site test columns resulted from conditions which are not usually present at archeological sites.

Table 8. Seeds from 13CD10

	0-2"	8-10"	18-20"	28-30"	48-50"	58-60"	70-72"
CHENOPODIACEAE							
Chenopodium album	2	2					
C. hybridum	10	30	30	11	61	38	28

Table 9. Seeds from JE1-67 (Aztalan)

	F-3	F-6	F-9	F-14	F-20
CHENOPODIACEAE					
Chenopodium album	1	7	5	2	
PORTULACACEAE					
Portulaca oleracea	2	6			5
CARYOPHYLLACEAE					
Lychnis alba		1			
POLYGONACEAE					
Polygonum careyi			1		
P. convovulus		2			
P. sp.	1	1			
OXALIDACEAE					
Oxalis stricta		1			1
AMARANTHACEAE					
Amaranthus retroflexus	4		2		
LEGUMINOSAE					
Trifolium sp.	1	2	1	1	1
UNIDENTIFIABLE		4			3

Table 10. Seeds from 13PM40

	0-2''	2-4''	4-6''	8-10''	14-16''	48-50''	52-58''	60-62''	62-64''	64-66''	68-70''	70-72''	76-82''
CHENOPODIACEAE													
Chenopodium album	4	4	5										
C. hybridum	2												
C. boscianum	2			3									
POLYGONACEAE													
Polygonum aviculare													
AMARANTHACEAE													
Amaranthus retroflexus	6	8							1				
GRAMINAE													
Setaria sp.		9						1					
LEGUMINOSAE													
Trifolium sp													
VERBENACEAE													
Verbena sp.						1							
ULMACEAE													
Celtis sp. (presence/absence)		x				x	x	x		x		x	x
UNIDENTIFIABLE	3	3	2	2								1	

	88-90''	90-92''	94-96''	106-108''	108-110''	110-112''	112-114''	114-116''	122-124''	124-126''	126-128''	128-130''	130-132''
CHENOPODIACEAE													
Chenopodium album													
C. hybridum				1					1	2	1		
C. boscianum						1	3	9	5		1		1
POLYGONACEAE													
Polygonum aviculare													
AMARANTHACEAE													
Amaranthus retroflexus													
GRAMINAE													
Setaria sp.													
LEGUMINOSAE													
Trifolium sp.													
VERBENACEAE													
Verbena sp.													
ULMACEAE													
Celtis sp. (presence/absence)		x	x		x		x						
UNIDENTIFIABLE				1									

Table 10 cont.

	134-136"	136-138"	140-142"
CHENOPODIACEAE			
Chenopodium album			
C. hybridum			
C. boscianum	2	1	
POLYGONACEAE			
Polygonum aviculare			
AMARANTHACEAE			
Amaranthus retroflexus			
GRAMINAE			
Setaria sp.			
LEGUMINOSAE			
Trifolium sp.			
VERBENACEAE			
Verbena sp.			
ULMACEAE			
Celtis sp. (presence/absence)			
UNIDENTIFIABLE		1	1

CONCLUSIONS

Although the seed analysis undertaken was of limited value in interpreting the rather enigmatic Harvey site, it was useful in a broader sense as a test of the potential and problems of the approach in archeology. This study confirmed the fact that small seeds, normally overlooked in routine excavation can be collected in the field and recovered through the use of water flotation and screening, procedures which do not require elaborate equipment or specialized skills. Thus, the approach is not an impractical one for archeologists. Secondly, seeds can be identified to the species level by the archeologist, if a reference collection is available, so that it is not necessary to employ specialists from another field to use the approach. Once the seeds have been identified, ethnobotanical and environmental information otherwise unavailable to the archeologist can potentially be revealed. The potentials of the method as applied to the Harvey site material were limited by certain problems. Sampling procedures were inadequate for using the approach environmentally. In order to reconstruct the native plant community, a step necessary for environmental inference, samples must be taken from undisturbed areas. Only one area outside the site proper was tested and the

area proved to have been disturbed. This problem could have been avoided by taking samples from a number of different locations outside of the site. A more serious problem encountered in this analysis is that of contamination. Samples from both the features and the test columns indicate that recent seeds can move from the upper levels of a site to considerable depths. Furthermore, at the Harvey site, there was no way to distinguish between the intrusive seeds and others on the basis of seed condition. A final judgment as to the applicability of seed analysis in archeology must await further investigation. The potentials of the approach for both cultural and environmental interpretation are demonstrable. Other critical and systematic studies will determine if the problems encountered at the Harvey site are widespread enough to inhibit the successful application of seed analysis in archeology.

REFERENCES CITED

Baerreis, David
1969 "Environmental Reconstruction through Molluscan Remains: A Preliminary Report on the A.C. Banks Site," unpublished manuscript.

Barghoorn, Elso
1943 "Collecting and Preserving Botanical Materials of Archeological Interest," AMERICAN ANTIQUITY, Volume 9, 289-294.

Curtis, John
1959 THE VEGETATION OF WISCONSIN.

Daubenmire, R.F.
1959 PLANTS AND ENVIRONMENT (2nd Edition).

Fernald, Merritt
1950 GRAY'S MANUAL OF BOTANY (8th Edition).

Jenks, Albert
1902 "The Wild Rice Gatherers from the Upper Great Lakes," 19TH ANNUAL REPORT OF THE BUREAU OF AMERICAN ETHNOLOGY, 1013-1160.

Johnson, Elden
1969 "Archeological Evidence for Utilization of Wild Rice," SCIENCE, Volume 163, No. 3864, 276-277.

Martin, Alexander and Barkley, William
1961 SEED IDENTIFICATION MANUAL.

Meighan, C.W., et. al.
1958 "Ecological Interpretation in Archeology, Part 1," AMERICAN ANTIQUITY, Volume 24, No. 1, 1-21.

Prufer, Olaf
1966 "The McGraw Site: A Study in Hopewellian Dynamics," SCIENTIFIC PUBLICATIONS OF THE CLEVELAND MUSEUM OF NATURAL HISTORY, n.s. Volume 4, No. 1.

Spector, Janet
1970 THE HARVEY SITE AND SEED ANALYSIS, unpublished M.A. thesis, University of Wisconsin.

Struever, Stuart
1962 "Implications of Vegetal Remains from an Illinois Hopewell Site," AMERICAN ANTIQUITY, Volume 27, No. 4, 584-587.

1968 "Flotation Techniques for the Recovery of Small Scale Archeological Remains," AMERICAN ANTIQUITY, Volume 33, No. 3, 353-362.

Thorp, James
1967 "Effects of Certain Animals that live in Soils," SELECTED PAPERS IN SOIL FORMATION AND CLASSIFICATION, 191-208.

Watts, W.A. and Winters, T.C.
1966 "Plant Macrofossils from Kirchner Marsh, Minnesota—A Paleoecological Study," GEOLOGICAL SOCIETY OF AMERICA, Bulletin:77, 1339-1355.

Yarnell, Richard
1964 "Aboriginal Relationships between Culture and Plant Life in the Upper Great Lakes Region," ANTHROPOLOGICAL PAPERS, Museum of Anthropology, University of Michigan, No. 23.

1966 "Archeological Plant Food Remains from Wisconsin," WISCONSIN ARCHEOLOGIST, Volume 47, No. 4, 196-202.

THE ONEOTA COMPONENT AT THE PORTE DES MORTS SITE, DOOR COUNTY, WISCONSIN

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The Porte des Morts site is a multi-component stratified site on the mainland side of the Porte des Morts Straits between the tip of the Door Peninsula and Detroit Island. In a previous report on this site, Ronald J. Mason (1967) presented information on the North Bay component; the present report is limited to a discussion of the Oneota occupation while a third projected paper will cover Late Woodland materials. For a description of the site, general information on physical stratigraphy, data on land ownership, etc., the reader is referred to Mason 1967. Such information will be repeated here only when pertinent to the Oneota occupation.*

Archaeologically, the Oneota deposits at Porte des Morts were very much like those at other sites in Northeastern Wisconsin. Oneota sherds were present over a very wide area, particularly on the surface and often with little depth. Back from the shore, material was present at least in small scatterings far into the woods and all along the dirt roads. As far as formal excavation units are concerned, the major concentration of Oneota artifacts was in Units E, F, H, and I(Fig. 1). Elsewhere on the site, there were always some Oneota sherds in the test pits and large excavation units, but not in numbers great enough to indicate any intensive settlement there.

Excavation Unit E was the point farthest down the shore to yield any appreciable amount of Oneota material. Of the 444 Oneota sherds to come from this unit, the great bulk of them were grit-tempered (333) and plain (324). From Excavation Unit E, a series of test pits and one other excavation unit (G) failed to produce any signs of greater concentration in that direction. However, in the woods beyond these test pits, cottage construction may have destroyed any evidence that formerly might have been present. At the

*I would like to express here our appreciation to Mrs. George Apfelbach of Fish Creek, whose information originally drew our attention to the Oneota occupation at Porte des Morts, and to the University of Wisconsin-Green Bay for a Chancellor's grant which aided in preparation for publication.

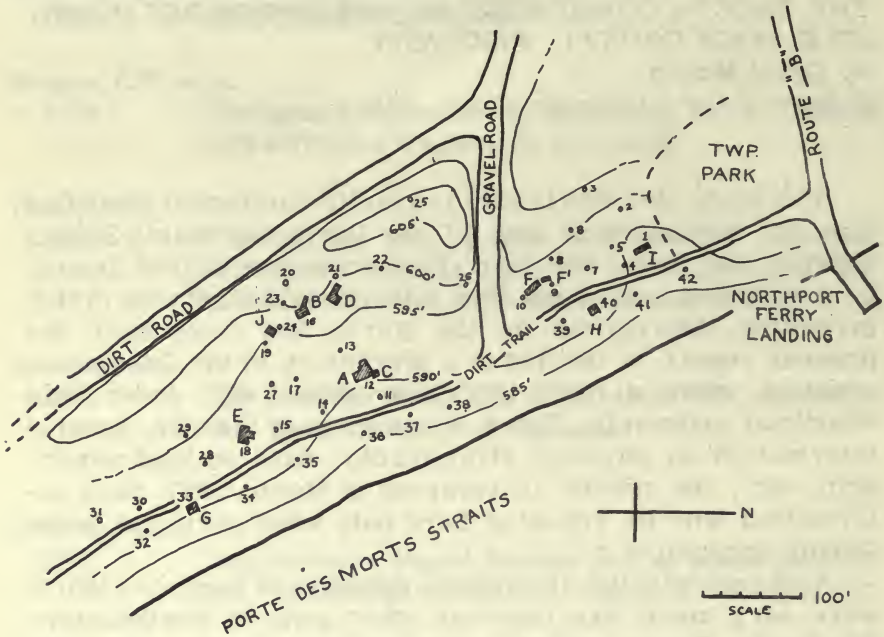

Figure 1—The archaeological site at the Porte des Morts Straits.

far end of the Porte des Morts Straits, a series of small limestone cliffs delimits the sandy area, a situation typical of the Door Peninsula and incidentally serving to pinpoint places of aboriginal settlement there. Beyond these cliffs, no aboriginal artifacts were found. The situation of Porte des Morts as the nearest sandy area facing the islands in northern Lake Michigan suggests that it was not only a sheltered living area with convenient access to fishing grounds but also a jumping-off place for island-bound traffic.

In all units, the vertical distribution of grit and shell-tempered Oneota sherds was checked in order to see if the same relative frequency through time obtains here as the Mero site farther south (Mason 1966:160-161). There, grit-tempered Oneota sherds were most frequent in deeper deposits, declining in the upper, more recent levels, with a reverse distribution for shell-tempered sherds. The total ceramic sample at Porte des Morts scarcely reaches half that at the Mero site, however, and there is a clear confirmation of the trend in only two or perhaps three areas.

One of these, Excavation Unit F, was excavated in arbitrary four-inch levels (as were all units where natural stratification was not present). In this unit, a total of 323 Oneota sherds indicates a gradual increase in the frequency of shell tempering through time and a concommitant decline in the popularity of grit-tempering. Grit-tempered sherds reach a peak in numbers earlier than their shell-tempered counterparts and decline from that point on. The largest sample of Oneota pottery (1827 plain and decorated sherds) came from Excavation Unit F (see Table 1). In Excavation Unit H, where excellent natural strata were preserved, there is a more ambiguous distribution of

Table 1.-- The distribution of shell and grit-tempered Oneota sherds by unit and level. The percentages from the Mero site have been recomputed to include only Oneota sherds.

level	shell no.	%	grit no.	%	totals
Excavation Unit E					
0-4"	25	37.9	41	62.1	66
4-8"	90	27.3	240	72.7	330
8-12"	7	19.4	29	80.6	36
12-bottom	4	33.3	8	66.6	12
Excavation Unit F					
0-4"	108	85.4	20	15.6	128
4-8"	80	54.1	68	45.9	148
8-12"	11	28.9	27	71.1	38
12-bottom	4		5		9
Excavation Unit I					
0-4"	330	78.8	89	21.2	419
4-8"	512	61.0	327	39.0	839
8-12"	154	47.7	169	52.3	323
12- bottom	63	34.1	122	65.9	185
Excavation Unit H					
humus	79	92.9	6	7.1	85
upper midden	162	48.9	169	51.1	331
buried beach	4		4		8
Mero site Oneota totals (from Mason 1966, Table VI, 176)					
1	150	75.8	48	24.2	198
2	478	72.1	185	28.0	663
3	143	49.1	148	50.9	291

grit and shell tempering. The percentages as they stand (Table 1) confirm the temper shift, but a good bit of the absolute increase in grit-tempered Oneota material in the upper midden is owing to the presence of 44 sherds from a single vessel.

When compared directly with the percentages from the Mero site, the figures from Excavation Units F and I behave in a comparable manner allowing for the fact that the deposits at the Mero site were more distrubed than at Porte des Morts. Excavation Unit H, which has a truncated distribution in the ground as far as Oneota artifacts are concerned, provides evidence of a time (upper midden) when shell and grit-tempered *sherds* were equally plentiful. Taking into account the top-heavy character of the grit-tempered component in the upper midden, perhaps the most valuable comment from Excavation Unit H is the abrupt decline of grit temper in the humus. The early and definite preference for grit tempering is certainly a remarkable one given the overwhelming commitment to shell tempering observable in the latest deposits.

Excavation Unit I, so rich in Oneota artifacts, was the only one to produce any historic objects: a single opaque blue bead and a piece of brass kettle (?) scrap from the humus. The Porte des Morts Straits, at least in local folklore, has been the scene of recent Indian settlements, battles, and maritime disasters. Archaelogically, in any event, there is nect to nothing to demonstrate an occupation of the immediate area in the historic period. It may well be, however, that Excavation Unit I was placed on the very fringe of historic Oneota or Late Woodland settlements and that evidence for their presence was removed and destroyed during the preparation of the township park, the Northport Ferry Landing, and the building of many cottages along the shore to the north of the ferry pier.

As far as physical evidence recovered from the site, the Oneota occupation is represented by very few features of any kind. Although an occasional small trash pit was found, there were no large storage pits, burials, house remains, or even fire pits. The dense forest covering the site is a young one and presumably was preceded by the less scrubby, more mature pine forest destroyed during lumbering operations of the last century. The presence of this forest may be a partial explanation for the absence of fea-

tures, but a cultural explanation is at least as tenable. The conspicuously unforested (but unfortunately plowed) Mero site to the south was similarly lacking in many definable features, and it has been suggested that it might have represented a seasonal, perhaps a summer, camp (Mason 1966: 178). Over most of the Porte des Morts site, the Oneota materials were most abundant in a gray-black midden just beneath the thin humus cover. This gray-black midden was 12 inches thick in places and faded in an often indistinguishable manner into the lower middens. Occasionally, as in Excavation Unit H, clearly separable strata were present, but this was the exception rather than the rule.

POTTERY

Most of the artifacts that could be unhesitatingly identified as belonging to the Oneota occupation were potsherds. Only rarely were other artifacts associated so closely with these sherds as to be most likely originally deposited with them. In many cases, cheek by jowl deposition of Late Woodland materials left the original association difficult to determine. The total ceramic sample was 3883 sherds, 2249 (57.9%) shell-tempered and 1634 (42.1%) grit-tempered. Of this total, only a small number bore any decoration at all, confirming an impression formed in the field that the Porte des Morts Oneota is an overwhelmingly plain complex (see Table 2). Only 142 body sherds from approximately 21 vessels had any surface decoration; these represented 3.6% of the sherd total, 2.0% (78) of them being shell-tempered and 1.6% (64) grit-tempered. An additional 222 were rimsherds representing a minimum of 86 vessels. For the most part, shell or grit was sufficiently plentiful in the sherds as to leave no doubt which was tempered with which. In a small number of cases, however, only microscopic examination revealed the presence of shell casts; and it is in this area where the potter seems to have been either in the process of changing from one tempering material to another or unmindful of what was used that some difficulties arose. Unless otherwise stated, the presence of shell or shell casts in the sherds was the determinant for identifying a sherd as shell-tempered, whether or not some grit was

Table 2. -- Decorated body sherds.

	shell				grit			
	sherds	%	ves.	%	sherds	%	ves.	%
Lake Winnebago Trailed	23	29.5	3	20.0	.	.	.	.
unclass. trailed	8	10.2	1*	6.6	6	9.4	3	50.0
Perrot Punc.	8	10.2	2	13.3	.	.	.	.
broad trailed	2	2.3	1	6.6	.	.	.	.
fine line incised	8	10.2	1	6.6	.	.	.	.
punctated	4	5.1	3**	20.0	7	10.9	2*****	33.3
misc. incised and trailed	22	27.2	1***	6.6	7	10.9	.	.
incised and punctated	2	2.3	2	13.3	.	.	.	.
Ramey Incised	1****	1.3	1	6.6	.	.	.	.
unclass. zigzag	.	.	.	.	44	68.8	1	16.7
	78	99.3	15	99.6	64	100.0	6	100.0

* this is a minimum figure; maximum figure is 8, all represented by 1 small sherd each.

** this includes the one body sherd belonging to a probable Lake Winnebago Trailed vessel defined from its rims and 3 trailed sherds included in the above count as one LWT vessel.

*** most of these are small scraps; therefore no vessel counts have been made. The single exception consists of 4 sherds from a child's pot.

**** total representation is 6 sherds, 5 of which are rims and included in Table 3 as plain rims.

***** many of these sherds are very small, and some offer only one big dimple as a decoration; maximum count is 6 vessels.

additionally noted.

There are no observable differences in surface color between the grit and shell-tempered sherds; gray to buff and gray-buff are the dominant colors with all three color variations sometimes being present on the same sherd. The

grit-tempered sherds are on the average harder than the shell-tempered ones, but this may very well be because of considerable leaching and rotting away of the surface as a result of lying in the ground. There is a slight difference between the two groups as regards sherd thickness: a sample of 302 shell-tempered sherds was found to have a range in thickness of 2 to 8 mm. with a mean of 4.68, while a sample of 266 grit-tempered sherds had a range from 2.5 to 8.0 with a mean of 5.09 mm. No coil fractures were observed in any of the sherds, and the most common feature left from the manufacturing process are wipe marks along the interiors parallel to the rim.

In contrast to the material at the nearby Mero site, few of the Porte des Morts sherds were split or sloughed off to any great extent. The annoying bedding of a layer of rootlets through the sherd cores and their subsequent splitting as the roots dried was a common feature of the Mero Oneota sherds, but at Porte des Morts it was not as frequent. Almost universally, however, the rimsherds exhibited some evidence of burned organic material on the interior or exterior (or both). This was never very great in actual amount (only 1 gram was recovered in scraping all the Oneota rims), but its presence was a consistent feature. One other general characteristic of the pottery as a whole should be noted: not a single fragment of a handle was recovered nor are there any suitable places on sherds where handles might have been attached. The lack of handles or of possible handle attachments fits well with the relative scarcity of such appendages at the Mero site.

SHELL-TEMPERED POTTERY

Shell-tempered pottery from the Porte des Morts site is seldom in as pristine a condition as, for example, that from Lasley's Point. The sherds are heavily leached and as a consequence are distinguished by pitted and irregular surfaces. As a rule, however, the pottery did not contain enough shell in the first place to leave the sherds porous and crumbly after its loss.

Trailed sherds comprise the largest category of decorated body sherds. Of a total of 31 such sherds, 8 are small with straight line trailing (2-4 mm. across), some

of it becoming quite shallow and faint at the ends of lines. In all cases, the trailing is of vertical lines in rows, probably always ending at the vessel shoulder. Although only small and occasional sections of shoulder are preserved, it seems likely that these vessels conform to the common Oneota shape of a constricted necked jar with an everted rim. Most of these 8 sherds fall within the range of *Lake Winnebago Trailed* and probably could be assigned to that type. However, in view of the strikingly narrow trailing and the noncommital size of the sherds themselves, they have been listed in Table 2 as "unclassified trailed." Seventeen of the remaining trailed sherds belong to a single vessel of the type *Lake Winnebago Trailed* (Pl. 2, top); this vessel is additionally represented by 2 rimsherds (included separately in the rim table as *Lake Winnebago Trailed* rims). It was a large globular jar with a constricted neck and a rim angle so acute as to approach the horizontal (Fig. 2, F). Some sherds were badly sloughed off, but what could be measured of the vessel wall was thicker at the rim (5 mm.) than toward the shoulder (7 mm). Although heavily shell-tempered, these particular sherds were generally less decayed than many other shell tem-

Plate 2—Trailed and incised shell-tempered sherds: top, LAKE WINNEBAGO TRAILED.

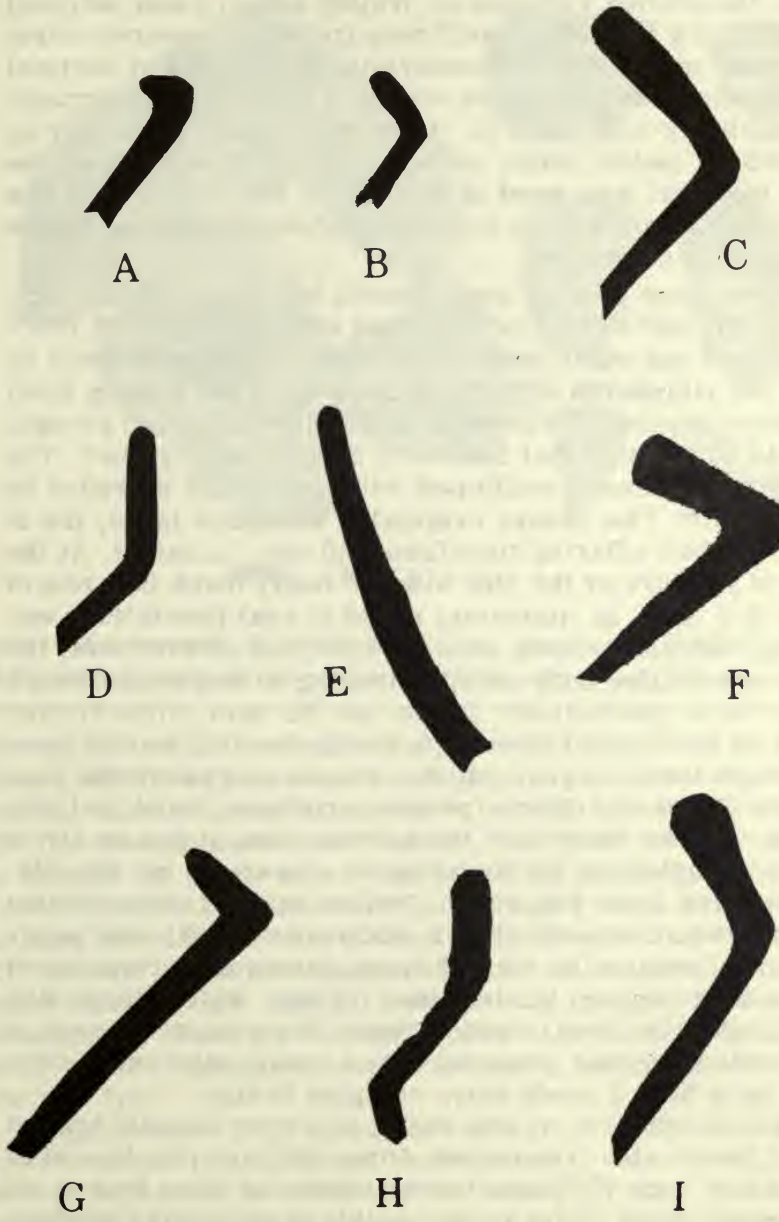

Figure 2—Representative rim profiles.

pered sherds on the same site; whether this is owing to original excellence or luck in the ground is difficult to judge. Decoration consists of trailed lines (5 mm. across) arranged in a band of at least 5 deep (probably several more) horizontal to the rim and underlain by an array of vertical trailed lines encircling the vessel. The lip is very broadly and shallowly scalloped as if smoothed discontinuously by a thumb or paddle edge; subsequent to this scalloping, the same tool that was used in decorating the vessel body was laid transversely across the lip, avoiding the original ridges made during scalloping.

Three other trailed body sherds belong to a *Lake Winnebago Trailed* vessel represented additionally by 10 rim-sherds and one other body sherd. There is unfortunately no fit of the rimsherds with the body sherds; but judging from the close physical correspondence between the two groups, there is little doubt that they do in fact belong together. The flat lip is shallowly scalloped with some clay extruded on the exterior. The vessel originally was quite large, tan in color, and had a flaring rim of about 20 mm. in height. At the point of juncture of the rim with the body, there is a row of large (5-6 mm. in diameter) round to oval punctations encircling the constricted neck at intervals of 6-10 mm; the single non-trailed body sherd belonging to this vessel bears one of these punctations. Little can be said of the trailed design on this vessel other than that the trailing was of rows of straight lines. In general, this vessel represents the best that the Porte des Morts potters produced; hard and thin (6 mm. on the body) for its evident size, it has an air of quality conspicuous by its absence elsewhere on the site.

The third *Lake Winnebago Trailed* vessel is represented by three small sherds (P1. 2, bottom row, left) with punctations in addition to trailed lines. Decoration consists of groups of 4 vertical trailed lines (3 mm. wide) alternating with a single column of punctations. The area preserved is at the shoulder and provides only a small segment of what might have been a much more complex design.

Two sherds (P1. 1, top right) of a very broadly trailed vessel were also recovered from the site (in the sod of Excavation Unit F). Since these rimsherds were broken off very close to the lip, it is impossible to determine whether the original vessel was a bowl or a constricted necked jar; the angle of the broad finger-trailing to the rim argues that

Plate 1—Shell-tempered decorated sherds: left, section of a PERROT PUNCTATE vessel; top right, exterior and interior of broadly trailed rimsherds.

the vessel walls were perfectly straight but offers no certainty either way. Decoration consists of broad (10 mm.) trailed lines running down the exterior at a slight angle to the lip. The lip itself was rounded, and on the interior there is a row of deep, narrow punctations parallel to the lip, each separate punctation set at an angle to it; these punctations were made with a slender, pointed tool with a blunt tip (an awl?). The presence of this kind of interior lip treatment places the vessel outside the range of the type *Koshkonong Bold* as defined by Hall (1962: 72-75) unless very broad trailing can be construed a sufficient criterion for that type.

Eight sherds of *Perrot Punctate.* (Hall 1962: 175-177), representing two different vessels, were recovered from widely separated sections of the site (P1, left). The first, represented by 7 body sherds (Excavation Unit I), was apparently a large constricted necked jar. The design consists of nested chevrons composed of groups of three parallel

incised lines, each group of lines with a fringe of elongated punctations appended to the bottom member (Fig. 3, top). The chevrons themselves are intersected by still other groups of parallel lines in a total design not readily interpolated from the remaining sections. A single rimsherd from the same unit and level may belong to this vessel: it has a plain exterior surface, a flattened lip, and long punctations on the interior perpendicular to the lip. Nine plain body sherds with repair holes drilled neatly into them from the exterior also

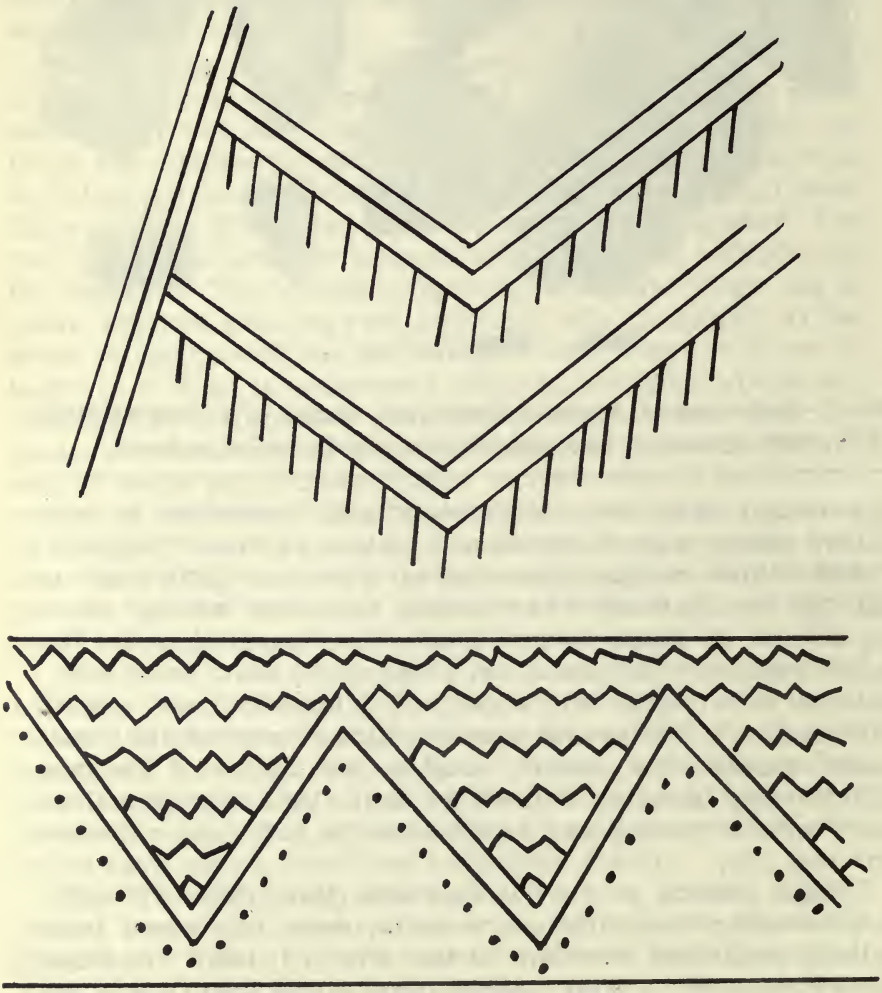

Figure 3—Pottery decorations: top, PERROT PUNCTATED; bottom, grit-tempered vessel with zigzag design.

belong to this vessel. The other vessel of *Perrot Punctate* is represented by a single sherd from test pit 30. Part of a shoulder, it clearly shows a fringe of long punctations appended to nested parallel lines.

The only other trailed shell-tempered pottery from the site is a vessel which most nearly resembles *Ramey Incised* (Pl. 3, top). While not a typical example, it would not stand out in a large sample of *Ramey Incised* sherds from such a site as Aztalan. Sherds from Aztalan in the collections from Lawrence University, for example, include a rim that except for its design might be from the same vessel. The 6 badly leached and porous sherds represent a jar (or perhaps a bowl; no cazuela or other shoulders have been preserved, however) that was originally very heavily shell-tempered. Before weathering distorted it, the surface was very smooth; even now in spite of the irregularities resulting from leaching, the surface is very smooth to the touch. Surface color is black with a lighter interior color (fading to gray and tan in places); the exterior surface was

Plate 3—Shell-tempered rimsherds.

carefully smoothed before firing and reflects light. The sherds are thickest just under the lip (7 mm.), thinning to 3 mm. farther down on the body. Decoration consists of a broad trailed line (6 mm.) in what was at least a partly curvilinear pattern; on the surviving sherds, a curved line arches to the right and then abruptly terminates in a short, straight line perpendicular to the rim. There is a cameo effect on the interior. The rim itself is short (12 mm.) and set on the body at an angle only slightly less than 90 degrees (Fig. 2, G). The lip is rounded, plain, and the rim is noticeably smoother on the interior surface than on the exterior. The sherds from this vessel were recovered from Excavation Unit A, where Oneota sherds from all levels comprised only 2.8% (a total of 36) of the sherd count. In stratum C of this unit, where all the sherds described above were found, only 4 other shell-tempered sherds occurred; the major pottery types were North Bay. Thus this trailed vessel is isolated both geographically, in the sense that where it was found is not one of the major areas of Oneota deposition, and culturally, in the sense that its most immediate and plentiful neighbors in the ground were North Bay sherds.

There are 30 body sherds with parts of incised designs on them (Pl. 2). Eight of these (Excavation Unit H) are from a single vessel with extremely fine line incising as decoration (Pl. 2, second row center); the incised lines are so fine as to resemble scratches made by a pin and in places are so light as to be almost non-existent. On all the sherds the design is very petite and consists of a single incised line from which are suspended short parallel lines and short pairs of lines so set with regard to each other as to form triangles. Evidently groups of parallel lines and triangles were alternated around the vessel shoulder. On several sherds, there are indications that more than one of these decorative lines may have been present, perhaps in widely spaced parallel units. Except for the facts that this is a technically well-made vessel and is apparently full-sized as well, it might have been a child's pot, so unsophisticated and scratchy is the decoration. The remaining shell-tempered incised sherds are all small scraps; and with one exception were decorated with what seems to have been units of parallel lines (ca. 1 mm. wide). Judging from the curvature of some of the sherds, these lines were ar-

ranged vertically on the vessel. The single exception is a small, crudely modeled child's pot (represented by four sherds) with incised decoration put on at random; short incised lines and gashes intersect and diverge in no recognizable pattern.

Two sherds of incised and punctated ware from this site provide some variation in the decorative modes. The first of these, a small section of vessel shoulder, is hard, thin, and impressive on this site because of its evident quality. The original vessel was decorated, at least in part, by vertical parallel lines ending at the shoulder; between every other pair of parallel lines at their point of termination is a small (4 mm. in diameter) annular punctation, evidently encircling the vessel as a shoulder decoration (Pl. 2, bottom row, left). The other sherd is part of a rimsherd with the flaing rim itself broken away. The decoration consists of a neat trailed line (3 mm. across) bordered by perfectly round punctations (Pl. 2, center row, right). The surviving decoration looks like the apex of a triangle surmounted by punctations. The rim of this vessel was originally set at an obtuse angle to the body, but none of it survives.

Shell-tempered sherds bearing punctations are rare at Porte des Morts, and those with punctations as the sole discernible decoration are rarer still (Pl. 1). All four of the surviving punctated body sherds are from the upper 4 inches of Excavation Unit I. One of these was a section of a constricted neck originally encircled by a row of enormous (12 mm. across) finger-tip impressions. Two other sherds were less spectacular: one with a single isolated row of small horizontal punctations and the other with a similar row of slightly larger ones.

Two sherds with repair holes were recovered from Excavation Unit F, both from the same vessel. Except for the *Perrot Punctate* vessel described earlier, this is the only instance of vessel repair noted at the site; no other drilled holes, whether for repair or for suspension, were found. The only other post-firing modification found was a roughly rectangular body sherd with a six-pointed asterisk crudely engraved on the exterior surface; its significance, if any, is unknown.

There are 109 shell-tempered rimsherds from Porte des Morts, and they represent a minimum of 42 vessels (see Table 3). The categories used to describe these sherds are

Table 3. -- Varieties of lip treatment; all rims, including those attached to decorated body sherds are included in this count.

lip form	shell sherds no.	shell sherds %	shell ves. no.	shell ves. %	grit sherds no.	grit sherds %	grit ves. no.	grit ves. %
plain	14*	12.8	7	16.7	13	11.3	8	18.2
scalloped	22	20.1	12	28.6	60	51.7	17**	38.6
exterior lip	15	13.8	6	14.3	7	6.0	5	11.4
inner lip rim	4	3.7	3	7.1	.	.	.	.
notched	13	11.9	6	14.3	14	12.1	9	20.4
notched, cord-marked	1	.9	1	2.4	.	.	.	.
sinuous	13	11.9	5	11.9	5	4.3	5	11.4
other	15	13.6	.	.	17	14.7	.	.
Lake Winnebago Tr.	12	11.0	2	4.7	.	.	.	.
	110	99.9	42	100.1	116	100.1	44	100.0

total number of rimsherds: 225

total number of vessels estimated from rims: 86

* this count includes 5 sherds of the possible Ramey Incised vessel.

** a minimum count, 26 at maximum.

for the most part the same as those employed in Mason 1966 for the Mero site. In some cases, the categories did not fit the Porte des Morts material as well in spite of the close proximity of the two sites. In particular, distinctions between "scalloped" and "notched" forms of lip treatment as maintained for the Mero site were less successful here since they seemed disconcertingly to fade into each other, sometimes on the same vessel. In general, "notched" is limited here to instances where actual removal of the clay occurred with any questionable examples being retained in the scalloped category. The distinctions between degrees of scalloping (shallow, moderate, deep) have not been employed because the

total sample size is so small and so uniform compared to the material from the Mero site.

Judging from the small number of such rimsherds, few of the vessels had plain lips (Pl. 4, bottom row, center and right). Only 14 plain rimsherds were receovered (including 5 from the possible *Ramey Incised* vessel described above) representing at most 7 vessels. One of these was a small bowl (or deep cup) with a crudely flattened lip; three others had small flaring rims (9-12 mm. high) and constricted necks. There is no uniformity in the treatment of the lips: they range from slightly flattened to rounded to thickly rounded. One of the flaring rims has traces of what might be brushing (or nearly obliterated cord-marking) on the exterior surface. The distribution of these sherds on the site is interesting; with the exception of the bowl or cup (represented by 4 sherds), the 5 *Ramey Incised* rims, and a single rim from an isolated test pit, all of them come from Excavation Unit I, the locus of the greatest Oneota activity. The bowl

Plate 4—Shell-tempered rimsherds: top, scalloped; center, exterior lip decoration; bottom, interior lip decoration and plain lips.

was one of the few Oneota vessels (or sherds, for that matter) recovered from Excavation Unit A, where the possible *Ramey Incised* sherds were found. In the case of the bowl, however, the sherds were from the upper midden and humus rather than the more deeply buried deposits.

Thirteen sherds, representing at most 5 vessels, were classified as having sinuous lips (Pl. 3, bottom right). This category is composed of lips that have been manipulated, probably between the fingers in some instances, so as to produce a wavy effect when viewed from above. In most cases, this form of treatment has thinned the lips appreciably, sometimes almost to a point; in others the thinning has been effectively masked by sufficient secondary smoothing of the rim as to produce a thicker flat top with heavy clay extrusions on both interior and exterior surfaces. For most of these sherds, little can be said of vessel size or shape; one is evidently from a broadly flaring rimmed vessel (rim height 31 mm.) with a constricted neck, and one other may be from a shallow bowl. They are as a whole the least well-made of the rimsherds; massive sloughing characterizes over half of them, and they are conspicuously pitted, leached, and soft.

A total of 22 rimsherds, representing 12 vessels, were classified as scalloped (Pl. 4, top). In many instances, scalloping was done with a narrow implement laid transversely across the lip; the effect is a regular, closely spaced scalloped decoration, not the broad scalloping associated with the *Lake Winnebago Trailed* rims described above. Most of these rims are additionally low (between 17 and 23 mm. high), thick, and in only three cases was enough of the rim preserved to confirm the presence of the familiar Oneota flaring rimmed vessel shape.

A minimum of 6 vessels are represented by 13 notched rims (Pl. 3, center). Some of these may be from constricted necked jars, but the very small size of the sherds makes vessel shape difficult to determine. Notching was done by means of a narrow tool that removed a section of the lip either obliquely across it (2 sherds, 2 vessels) or transversely (9 sherds, 4 vessels). In some cases, certainly, the notching grades into the narrower forms of scalloping, but as was indicated previously, an attempt was made to limit the use of the term "notched" to instances where clay had clearly been removed in the decorating process. One additional notched

rim (listed separately in Table 3) is from a deep bowl with a cord-marked exterior (Pl. 3, left). The lip was notched obliquely with a narrow tool, and cord-marking covers the exterior from immediately under the lip as far down as the vessel wall is preserved, with some indication that it was smoothed over nearer the base. The cord-marking is neatly done from left down to right; the cord iteself was a very loose two-ply with a clockwise twist. This vessel was heavily shell-tempered with leaching and deep pitting observable on both surfaces.

A sample of 15 rimsherds (6 vessels) was decorated at the juncture of the lip with the exterior rim (Pl. 4, center row). This form of decoration involves notching or impressing just beneath the lip and not impinging either on it or across it. With but two exceptions, all of the sherds were decorated with long narrow notches set at right angles to the rim or obliquely to it. In one case, the narrow notches were replaced by deep punctation-like impressions made from above, pushing the clay at the lip downwards; in another case, the same effect may have been produced by a fingertip. Two of the six vessels from this group were flaring rimmed jars, one with a broad, gently flaring rim of 37 mm. and the other a more typical 90 degree flare of only 15 mm. In all cases, the lips were smoothed flat or nearly so before decoration was attempted.

Only 4 sherds (representing 3 vessels) were decorated on the lip interior (Pl. 4, bottom left). Two of these have been previously described in conjunction with broad surface trailing. The remaining two sherds (and vessels) are alike in the respect that their decoration consists of a bifurcated impression (oddly resembling deer tracks) just inside the rim. In one case the vessel was a flaring rimmed bowl with a slightly greater than 90 degree flare and a rim height of 16 mm. The other vessel may or may not have had a smiliar flaring rim. The lips of both of these vessels were neatly squared with the decoration close to the inner edge in a single row; in one instance, the impressions were quite small (4 mm.) and in the other almost double that size.

GRIT-TEMPERED POTTERY

Excavation Unit H produced 44 sherds from a large flaring

Plate 5—Grit-tempered zigzag trailed sherds.

rimmed vessel, which in all respects is the most flamboyantly decorated of all the Oneota pottery recovered from the site (Pl. 5). There are 6 grit-tempered Oneota rimsherds (representing 5 different vessels) from the same level (level 2) of the same unit, but none of these fits any of the body sherds. The rimsherd nearest in ware characteristics to them is a notched flaring rim of 30 mm. in height, which, judging from some of the body sherds, was attached to the vessel almost at a right angle. The body sherds represent an area from right under the rim to well down on the shoulder, providing a good section of the body decoration. These sherds incidentally provide an excellent example of the uselessness of surface color as a guide to vessel separation or as a clue to reconstruction. The sherds as they came out of the ground looked deceptively as if they represented several vessels since their surface and core colors varied so extensively. A number of them were light buff from one surface through the core to the other; still others were red-buff or smokey-gray or even black all the way

through. In the laboratory it was discovered that all these variously colored sherds were in fact from a single vessel, the lines of color differentiation being the lines of original breakage. Exposure to different conditions in the ground produced the striking differences in color, even within such a strictly delimited area as a single excavation unit. All of these sherds are heavily tempered with grit particles, many of which appear on the surfaces (especially on the interior); this crushed grit is locally available hornblend or gabbro, probably derived from granitic rocks. Some of the particles are surprisingly large, reaching up to 4 or 5 mm. in diameter. As a whole, this is a well-made vessel, hard and with carefully smoothed surfaces; like so many other Oneota vessels, it is thickest just under the lip (7 mm.) thinning down (to 5 mm.) on the vessel body.

The same care cannot be observed in the execution of the decoration, which, although complicated, is very sloppily applied (Fig. 3, bottom). The area above the shoulder is decorated by a combination of trailing (2-3 mm. across) and punctating. A pair of parallel trailed lines form deep joined chevrons all around the vessel, these are between 11 and 12 cm. from the apex of one chevron to its base where it joins the next. The points of the bases are about 10 c.m. apart while the tips at the top are about the same distance apart. The figures are not geometrically precise or even artistically well balanced. The underside of the set of trailed lines is bordered by hemispheric punctations quite close to and in some instances impinging carelessly on the lower line itself. The chevrons are filled with zigzag lines parallel to the rim, and in one section where a good part of the design still survives, a minimum of six such lines is present. The topmost zigzag line is above the chevron peaks and completely encircles the vessel. All of the zigzags were drawn with so little foresight that frequently their final zigs or zags had to be unnaturally stretched or compressed or contorted so as to fill a given space. As a result, the total design lacks something in both symmetry and balance.

Three other vessels of trailed grit-tempered Oneota pottery are among 6 trailed sherds recovered from the site (Pl. 6, top right). One of the sherds is heavily grit-tempered with a coarse texture and rough particles of quartz protruding on the surface. The designs on almost all these sherds appear to be groups of parallel straight lines, neither

Plate 6—Grit-tempered decorated body sherds and rimsherds.

well done nor precisely executed. One of the vessels was a globular jar, probably with a constricted neck, and trailing from neck to shoulder. The one exception to the presence of straight trailed lines is a single sherd (Excavation Unit F) representing a section from the neck of a constricted necked jar (Pl. 6, center, top). The section preserved is just under the rim, 13 mm. thick at its thickest point, and bearing a line of hemispherical punctations on the exterior under the rim, very reminiscent of the similar line sometimes found on vessels of *Lake Winnebago Trailed*. The trailed design on this sherd, however, is curvilinear, probably part of a guilloche or meander.

There are six small body sherds with incised lines on them, but there is little that can be said of them other than to record their presence. They are all very thin, tempered with fine grit, and bear one or two short sections of narrow incised lines. No comments can be made about design or probable vessel shapes.

One of the punctated vessels found on the site has as its

sole surviving decorative mode a line of elongated punctations around the shoulder at its widest point (Pl. 6, top row, left). As far as the 3 surviving sherds reveal, there is nothing more on the vessel shoulder. A second small gobular vessel has at least two rows (and probably several more) of closely spaced "deer track" punctations above the shoulder, each of which has left a cameo impression on the interior. In this instance, the vessel was a remarkably fine one--thin, hard, and with a polished surface (Pl. 6, center left). The remaining punctated sherds are distinguished by the presence of large (10 mm. in diameter) dimple-like impressions on the surface. In one instance, these form a distinct row across the sherd, resembling fingertip impressions. On the interior of this particular sherd, there are internal impressions bearing overlapping fingerprints as if the fingers of one hand had supported the vessel interior as each exterior impression was made.

The 116 grit-tempered rimsherds from this site represent a somewhat larger sample than do the corresponding shell-tempered rims (Table 3). The rims, however, are spearable into fewer descriptive categories; and because one of these categories, scalloped rims, accounts for over 50% of the total number, the rim sample itself seems more homogeneous.

There are almost exactly the same number of grit-tempered plain rims as there are shell-tempered ones, and they represent nearly the same number of vessels (Pl. 6, bottom). The 13 sherds are from 6 flaring rimmed vessels, 1 straight-sided vessel, and one whose shape is undetermined. Four of the flaring rimmed vessels are distinguished only by their temper and one of their dimensions from their shell-tempered counterparts: the rims are higher, ranging between 21 and 33 mm. The single exception is a tiny flaring rim (4 mm. high) set at an angle of 90 degrees to the body and with a neatly rounded lip. One of the vessels with a high rim is very reminiscent of a small "funerary" pot from the Walker Hooper site (McKern 1945:Pl. 66, no. 2). The lip is slightly flattened and beneath it is a band of three deeply incised lines encircling the vessel. The shoulder is more sharply angled than the Walker-Hooper specimen, however, and the body was considerably less bulbous (Fig. 2, H). The two sherds representing this vessel were found isolated in test pit 26, where their only companions in the ground were 2

Plate 7—Grit-tempered rimsherds: top, scalloped; center, notched, bottom, exterior lip decoration and sinuous lip.

North Bay body sherds and a single shell-tempered Oneota body sherd.

At least 17 and possibly as many as 26 vessels are represented by 60 scalloped rimsherds (Pl. 7, top). In all cases where vessel shape can be inferred, it is a constricted necked jar; the rims flare from the bodies at a 90 degree or greater angle, occasionally approaching 120 degrees (Fig. 2, C). Two of the vessels had very low rims (6 and 11 mm.) and bulbous bodies beneath them without any discernible constricted neck; both of these vessels were from the bottom of Excavation Unit I and therefore represent some of the earliest Oneota pottery on the site (Fig. 2, A and B). Before scalloping, the lips of the 60 rimsherds were rounded and remain so between the scalloping; about one quarter were additionally slightly smoothed and flattened, rather casually and perhaps with a thumb. Scalloping was accomplished by impressing a round tool across the lip; the resulting profile varies according to the diameter of the tool, the

closeness of the impressions, and the care taken by the potter. For the most part, scalloping is spaced closely together, resembling in this respect the corresponding shell-tempered sherds. There are three scalloped sherds, representing two different vessels, with crude crosshatched incising on the interiors of the flaring rims (Fig. 2, I). In places this incising is partially obscured by burned food material, but it is clearly not brushing or wiping. These two vessels are the only instances of such decoration at Porte des Morts, incising usually being confined to more traditional areas. One of the other scalloped vessels, an exceptionally heavily grit-tempered one, had a row of punctations around the neck at the juncture of the rim and body very like the punctations sometimes found on vessels of *Lake Winnebago Trailed*. Most of the six sherds from this vessel were from the bottom of Excavation Unit I and belong to the earlier end of the period of Oneota occupation at the site.

There are 7 sherds from 5 different vessels with decoration at the juncture of the lip with the exterior rim (Pl. 7, bottom left). In four cases, these vessels were flaring rimmed jars, but the shape of the remaining two is unkown. Decoration was either by short vertical gashes (3 instances) or by fingernail punctations (2 vessels). In all cases, the rim was flattened before decoration was attempted.

Fourteen rims, representing 9 vessels, have been classified as "notched." In most cases, the sherds (Pl. 7, center) are so small that vessel shape is impossible to determine. Some of the rims were certainly flaring, others probably so. In all cases a narrow notching across the lips (never oblique) is the mode of decoration; sometimes this was done with so sharp a tool as to resemble slicing rather than notching as such. In one instance, the rim had been folded over before the lip was notched; in another, a line of ragged punctations occurred on the rim exterior right under the lip.

Five grit-tempered rimsherds from as many vessels had sinuous lips (Pl. 7, bottom right). Four of the sherds came from flaring rimmed jars, some with very high rims (30 mm.). In all cases, the manipulation of the lip appears to have been done in the same manner as on the shell-tempered rims.

STRATIGRAPHIC RELATIONSHIPS

There are only a few places on this site where stratigraphic evidence is such as to provide information on chronological change during the Oneota occupation. One of these is Excavation Unit A, where the major component--a heavy North Bay occupation in Level E--was the most conspicuous feature. Above this level, in the humus and underlying tan sand, there were only a few Oneota sherds (11 plain shell-tempered body sherds plus 5 rimsherds representing at most a plain cup and a scalloped rimmed jar), but in Level C, in association with 102 North Bay and 7 Late Woodland cordmarked sherds, were the 6 sherds of the possible *Ramey Incised* (Pl. 3) vessel discussed above. If this is *Ramey Incised* or a local derivative thereof, then this is its northernmost manifestation in Wisconsin and the earliest Mississippian pottery on the site. An intriguing possibility is that the means that brought it here might be part of the same trading complex or diffusion network that put *Ramey Incised* vessels on Bois Blanc Island (Mc Pherron 1967:116-118). Below Level C, Oneota sherds were almost totally absent (1 single shell-tempered body sherd was found in Level E, otherwise exclusively North Bay in content). Also within Level C, there were two rim sections of a badly eroded shell-tempered vessel; both sherds now exist in the form of sherd cores with only tiny fragments of either of the original surfaces surviving. To begin with, the vessel appears to have had a plain lip, but no actual lip surfaces remain. The almost vertical rim is set at an angle of slightly greater than 90 degrees to the body and measures over 25 mm in height (Fig. 2, D). The almost vertical placement of this rim is unusual at Porte des Morts, where rims, if they are anything, are more inclined to strive for a horizontal position than to stand upright. A vertical rim profile is certainly compatible with the identification of its near neighbor as *Ramey Incised;* similar rim profiles are known from some *Grand River Plain* vessels elsewhere in Wisconsin (McKern 1945: Pl. 70, no. 12).

Excavation Unit I lacks natural stratification and was excavated in 4 inch levels down to a depth of 16 inches. There is some indication of typological changes from top to bottom as well as the previously cited temper shift from shell to grit. Most of the sherds identified as *Lake Winnebago Tr-*

ailed (10 sherds, 2 vessels) occurred in the first 4 inches with only 2 below 8 inches. Similarly, the single vessel of *Perrot Punctate* from this unit is from the humus with only 1 sherd below 4 inches. Although the sample is regretably small, it should be noted that while these two types were most frequent in the humus, it is between 4 and 8 inches that Oneota materials were absolutely most plentiful. Near the bottom of Excavation Unit I were rimsherds from two grit-tempered vessels with very low flaring rims. One of these (represented by 5 rimsherds) has a tiny right angled scalloped rim (in places under 5 mm. in height), which is so low as to be almost not there. Beneath the rim, the vessel body appears to have been bulbous and without much neck constriction. This vessel and a companion with a slightly higher rim (up to 11 mm.) were in a small pit appended to the bottom of the midden.

In broader terms, the collection from Excavation Unit I provides evidence of at least two different occupations: one connected with Lake Winnebago Focus pottery and the second with a grit-tempered complex dominated by *Carcajou Plain.* Both *Lake Winnebago Trailed* and *Perrot Punctate* occur in the humus in company with an overwhelmingly shell-tempered population of plain body sherds. Much of the other pottery from this same unit--judging from the absence of plain rims, the infrequency of body decoration, and the presence of a substantial number of grit-tempered sherds--can be classified as *Carcajou Plain.* The 2 grit-tempered vessels with very low flaring rims from the bottom of this unit may additionally qualify as early *Carcajou Plain* (Hall 1962:62). There is, however, little evidence to argue for the presence of its companion type, *Carcajou Curvilinear,* in view of the infrequency of curvilinear trailed lines. Since the type was defined to include an occasional straight trailed decoration, some of the unidentified straight trailed sherds--particularly those with grit tempering--might be so identified.

Elsewhere on the site, few other examples of *Lake Winnebago Trailed* occur anywhere other than in the humus or immediately below it. One trait, cited by Hall as a frequent feature of *Lake Winnebago Trailed* pottery (Hall 1962: 172), the occurrence of a row of punctations encircling the rim, may have an earlier antecedent here in the presence of such rows on two grit-tempered vessels, one with curvi-

linear trailing from Excavation Unit F in the 4-8 inch zone (Pl. 6) and the other from the bottom of Excavation Unit I.

The single cord-marked rimsherd (Pl. 3; Fig. 2, E) belonging to the Oneota occupation was found in an otherwise undistinguished collection of plain Oneota body sherds in Excavation Unit F'. It was beneath the humus zone in this unit, and its only associates in the ground were all grit-tempered. The Mero Complex Oneota contained 60 cord-marked body sherds (Mason 1966:162), but none of these is sufficiently diagnostic in its locus to provide any kind of chronological information. Hall records a single cord-marked Oneota sherd from a pit at Carcajou Point in association with objects of historic date (1962:78), but again there is no clear chronological assignment. Cord-marking occurs late in a number of Oneota-like complexes in the east, and there is no real evidence to countervene this impression from the Porte des Morts site.

The total situation in Excavation Unit H is not very helpful when attempting to decide where to place the 44 sherds of the grit-tempered, zigzag trailed Oneota vessel (Pl. 5) recovered from the upper midden. It is not compatible with Lake Winnebago Focus pottery, but it might very well belong to the Grand River complex at Porte des Morts. To use McKern's felicitous phrase, it may be a "locally peculiar" specimen (McKern 1945:149). It might also represent an entirely different occupation. The upper midden in which it was found was a clearly defined stratum below the humus; both grit and shell-tempered Oneota sherds were plentiful, but decorated sherds were rare. The only other decorated pottery associated with the zigzag trailed vessel were 8 sherds from a shell-tempered pot with very fine-line incising (Pl. 2, center).

CONCLUSIONS

As a whole the ceramic complex at Porte des Morts is distinguished by several characteristics. First among these is the extraordinarily high incidence of grit-tempering, which ranges from 42.1% of the total sherd count to 51.1% of vessels estimated from rims. Nowhere else within the foci defined as Oneota does the percentage of grit-tempering reach such a proportion unless it is at the Mero site, where

the percentage is 40% of gross sherd totals and 38% of all vessels estimated from rims. This great emphasis on grit-tempering may be mainly a phenomenon of the Lake Michigan shoreline. Grit-tempered Oneota components have been found in Wisconsin at least as far south as Kewaunee and Sheboygan Counties (Hall 1962: 63-64; McKern 1945: P1. 54) and as far north as Rock Island. Oneota material in the Neville Public Museum, Green Bay, includes a number of very small surface collections from several sites in Kewaunee County and some from immediately south of the Sturgeon Bay ship canal in Door County. At one of these locales--that cited by Hall from Kewaunee County--there is a proportionately large sample of grit-tempered sherds. Most of these 22 plain, grit-tempered body sherds are indistinguishable from the Mero site material, even to the presence of tiny gold flecks in the paste on both surfaces. The single grit-tempered rim has an obliquely notched lip and an almost vertical profile over a very bulbous body. Another site nearer Algoma again indicates the presence of grit-tempered sherds, but in the museum collection, at any rate, there are more shell than grit-tempered sherds present. In the area near Sturgeon Bay but actually on the Lake Michigan shore, a number of small surface collections in the museum again attest to the presence of grit-tempered Oenota, but here it seems to be associated with large quantities of shell-tempered sherds. On Rock Island, preliminary indications from recent Lawrence University excavations are that there is at least one grit-tempered Oneota component present, one stratigraphically separate from shell-tempered material. Some grit-tempered Oneota sherds have even been found on Bois Blanc Island in Lake Huron (McPherron 1967: 118-120).

Along the Green Bay shore, the major excavated Oneota site at Point Sauble (Freeman 1956) has produced no grit-tempered Oneota sherds at all, an odd contrast between the east and west sides of the Door Peninsula. There is, however, a multi-component site north of Point Sauble in what is now Dyckesville that has produced a few grit-tempered sherds. in a small surface collection in the Neville Public Museum, there are 7 grit-tempered body sherds and 1 plain rim. Associated shell-tempered material includes incised and trailed body sherds as well as a typical *Lake Winnebago Trailed* rim. Inland from Lake Michigan, there is as yet no

clear pattern for the distribution of the grit-tempered Oneota variant. Preliminary examinations of Oneota sherds from a series of sites along the central Fox River (Lawrence University collections) has produced very few grit-tempered sherds at all. A site recently excavated by Lawrence University on an old channel of the Little Eau Plaine River has produced a few grit-tempered sherds as far west as Stevens Point, but the percentage may turn out to be quite small. As far as present evidence indicates, the farther from the Lake Michigan shore an Oneota site is, the less likely it is to have a really large percentage of grit-tempered pottery on it. Certainly, if the northeastern Wisconsin area is to contribute significantly to the Oneota mainstream, the spatial parameters of the heavily grit-tempered Oneota will have to be more closely determined.

Another important attribute of the Porte des Morts Oneota is the total absence of handles of any kind. Whether a larger sample of pottery might have included at least one or two is a probability in view of the presence of three such appendages at the Mero site with its 50% greater sherd total. A low frequency of handles is, of course, a characteristic of the Grand River Focus, but the almost complete absence of them in the Door Peninsula sites is remarkable, even for Grand River.

Porte des Morts Oneota pottery is overwhelmingly plain, again a trait linking the site within the Grand River orbit. Of an estimated 86 vessels, only 24% (21 vessels) bore any decoration at all (a total that would be reduced even further were the Lake Winnebago Focus vessels eliminated from consideration). As small a percentage as this represents, however, it is actually *double* the percentage of decorated vessels at the Mero site.

There is some difference between the grit and shell-tempered vessels with regard to variety of body decoration present. Fewer grit-tempered vessels were decorated (6 of 21) and when body decoration is present on them, it is of a more limited range of variation than is present on shell-tempered vessels. Most of this sense of limited range is an artifact of including the obvious Lake Winnebago Focus material in any comparison; its presence weights the shell-tempered component in an almost flamboyantly decorated direction. Many more shell-tempered sherds are incised, and this represents one of the real differences between the shell and grit-tempered decorative devices. The presence of more in-

cising is one of the differences between Porte des Morts and the Mero site (36 sherds as opposed to 8 at the Mero site). Another is the total absence of embossing at Porte des Morts, a feature recorded in 10 instances at the Mero site; embossing is a popular trait at some Grand River sites, and its absence here may be a function of the smaller sample size.

Plain lipped vessels are infrequent at Porte des Morts, a fact of some importance in assessing its relationship with the Grand River Focus. Of all rimsherds, only 12% (representing 15 vessels) had plain lips, a percentage less than half that at the Mero site (35%). The significance of this low incidence lies in Hall's Grand River ceramic series, where the important categories *Grand River Plain* and Grand River Trailed are both defined as lacking lip modification. The low incidence of plain lips therefore places much of the Porte des Morts Oneota in the alternate Carcajou series and specifically includes it in *Carcajou Plain.* When breaking plain-lipped *vessels* down into their temper categories, there is little difference between grit and shell: 9% and 8% of all vessels respectively (as determined from rims). By way of contrast, there is a much higher incidence of shell-tempered plain lipped vessels at the Mero site than there is of grit-tempered ones (20% as opposed to 6% for grit).

There is not much difference in the percentages of scalloped lips between the Mero site and Porte des Morts, even allowing for the much larger sherd sample from the former site. On both sites, the percentage of scalloped lips reaches approximately 28% of shell-tempered vessels and 39% of grit-tempered ones. At the Mero site, many of the remaining shell-tempered vessels in the total vessel count have plain lips, but at Porte des Morts many of the remaining vessels fall into several minor lip categories, thus giving the impression of greater lip variation there.

One other trait of the Porte des Morts Oneota that deserves mention is the presence of incising on the broad flat interiors of flaring rims (Pl. 7, top right). There are two vessels recorded for this trait, both with scalloped lips and both grit-tempered. The incising on the rim interiors is very crude crosshatching in both instances, some of it so carelessly applied that it had to be repeated with some of the later lines obscuring and crossing the original ones. In-

cising or trailing on rim interiors is not a common Oneota trait, but it occurs at the Correctionville site (Henning 1961: 12, 13) on shell-tempered pottery and in much more formal designs.

STONE TOOLS

All chipped stone tools at Porte des Morts, unless otherwise noted, are made of a gray chert, sometimes white and sometimes a mottled dark gray. Occasionally it is banded or fossil bearing and very often it contains crystalline inclusions whose presence must have rendered much of it structurally unsound for tool making. Its source may have been the tablular chert deposits found in the cliffs in places along the shore; some of the artifacts still retain the long flat planes of the original surface. Glacial gravels in this area might have been an additional source of raw material, but no pebble rinds were observed on any of the surviving artifacts nor was debris from smashing open glacial cobbles recovered.

Twenty-five small triangular projectile points very probably belong to the Oneota component. Their distribution on the site, except for a few isolated specimens, corresponds to the area of greatest Oneota concentration (Excavation Units, I, H, F', E), but it should be noted that Late Woodland materials occurred in these areas, too. Except for two specimens which diverge sharply in two or more attributes each, the triangular projectile points are quite uniform within the limits of a not too precise flint technology. They are small and light. In length they exhibit a mean of 26 mm. within a range of 20-33 mm. In breadth and in thickness, the ranges of variation are 12-20 mm. and 3-6 mm. respectively. These dimensions are best reflected in weight, a measurement providing striking contrast with the stemmed and notched points from the North Bay deposits (Mason 1967) and which must signify different modes of hafting and possibly methods of propulsion. The triangular points range in weight from 0.6 to 3 grams with an average of 1.5 grams. Actually, the arithmetic mean does not appear to be a truly accurate approximation of the frequency distributions within fractions of grams since the distribution curve is definitely skewed. For example, 7 points weigh

between 0.6 and 1 gram, 5 points between 1.1 and 1.5 grams, and the remaining 8 and 1.6 and 3.0 grams. Only competed specimens were weighed, of course, but it is evident from inspection of broken triangular points that these determinations are not biased by this necessary selection.

All of the triangular points have straight to somewhat convex lateral edges--these attributes are frequently combined on a single specimen. Two points have very convex basal edges, 3 are slightly convex, 14 are straight, and 3 concave. Only 4 points are really carefully made; the majority are mainly flakes trimmed to triangular form. Eight are classifiable as bifaces and 12 are essentially uniface artifacts.

In addition to the triangular points, there is one small triangular stemmed point (Pl. 8) from the upper levels of Excavation Unit B (Ex). It is unlikely Oneota specimen, but it was found associated with both grit and shell-tempered pottery as well as one single Late Woodland cord-marked sherd. It is of a tan-gray chert, bifacially flaked and lenticular in cross-section, 29 mm. long, 18 mm. broad, 7 mm. thick, and weighs 2.6 grams.

Of a total of 7 scrapers that occurred in the deposits, 6 may belong to the Oneota occupation. Two are certainly Oneota, the other 4 very probably so. The two scrapers with unquestioned Oneota affiliation are quite small; one (from the humus of Excavation Unit H) is a thumb-nail scraper with a steep working face (roughly 25 mm. across), and the other is a crude rectangular tool that resembles a homemade gunflint that was never put to use (20 by 25 mm.). Two other scrapers are minimally worked flakes (P 1. 8) whose undersides are the unretouched bulbs of percussion and whose only modification consists of the tiny beveled scraper edge. Both are from Excavation Unit I in contexts almost certainly Oneota in character. The scarcity of scrapers in the Porte des Morts Oneota deposits contrasts with some other Oneota sites in Wisconsin, but it is becoming increasingly clear that presence or absence of end scrapers of itself is not as diagnostic a feature as was once hoped (McKern 1945:133-134). It is more likely an indicator of different emphases in the activities carried out at each stie.

A single stone awl came from level 2 in Excavation Unit

Plate 8—Stone and copper tools: top, projectile points; center, stone awl; bottom, "butter knife."

H. It has a general triangular shape with a blunted tip and an overall use patina. It was held in the fingers, and a series of long cuts are visible on one face where an attempt was apparently made to cut it down for a more comfortable fit (Pl. 8, center; for a similar specimen see McKern 1945: P l. 40, 14).

A number of stone tools of unknown function occurred in the deposits. One of these was a small assymmetrical flake knife (?); it has few use marks along the blade, but there is battering at the juncture of the haft section with the blade, indicating a definite back and forth movement. Its dimensions are 42 by 14 mm. Several small broken ovate tools, bilaterally worked and not very well made, may have been knives or preforms.

There are two unmodified, oval granitic cobbles that exhibit signs of use, probably as hammerstones on chert. The more intensively used of these (75 by 85 by 35 mm) has seen service on both faces and along the edges; use marks in the stone are deep, jagged, and striated. Appar-

ently, it was used to work material much harder than it is. The second hammerstone (100 by 67 by 47 mm) had been used less than the first with marks from use confined almost entirely to the faces.

In Excavation Unit B (Ex), there was a concentration of stone tools in the first two levels, which in this area includes the recent gray sand humus zone and the immediately underlying light tan sand down to 9 inches below the surface. Below 9 inches is a dark brown culturally sterile layer that effectively seals off the North Bay middens beneath it. In these upper two levels, at the juncture of the first two levels, 14 whole or partial stone tools were recovered from an area less than five feet square in association with a large amount of rough chert waste. These tools include large biface preforms, 1 triangular point, the small stemmed point mentioned above, crude knives, and pieces of all of these. In the same two levels, Oneota sherds were vitually absent. This area contrasts with such loci as Excavation Unit I, which contained 9 of the 25 triangular points but only 7 fragments similar to those in the B Extension. It also contrasts with sites elsewhere in Door County where masses of crude unfinished tools and chert waste have been assumed to be earlier in time. Here there is no question but that the chert concentration is post North Bay and either Oneota or Late Woodland in period.

BONE TOOLS

There were comparatively few bone tools from the entire Porte des Morts site although bone preservation was exceptionally good there. Only four of the tools could be associated with the Oneota occupation. All of these were from Excavation Unit H, and without exception they are fragmentary and eroded. Three of the fragments are from split bone awls; the fourth is a small section of worked antler tine. The bone awls (2 from the humus, 1 from level 2) conform to the usual Oneota variety: they are made from split deer bone with an abrupt taper near the tip. One of the surviving sections is a blunted base, the two others tips only.

COPPER ARTIFACT

The only other artifact from the Oneota occupation is a small copper "butter knife" (Pl. 8). It came from the humus of Excavation Unit H where most of the pottery was shell-tempered Oneota (3 Late Woodland cord-marked sherds were also present). The knife is crudely hammered near the tang, but in spite of age and corrosion, it is still surprisingly sharp along its finely ground glade. Similar specimens are associated with Late Woodland occupations at the Juntunen Site (McPherron 1967).

SUMMARY

The archaeological site at Porte des Morts was occupied at least twice in its long history by peoples who may be classified as part of the Oneota tradition. As was the case at the Mero site, the bulk of the material fits best into the Grand River Focus. The plainness of the pottery, the absence of handles, and the compatibility of the pottery types with categories formally set up by Hall for Grand River are the principal criteria for so identifying it. In the high incidence of grit tempering and the varieties of decorated vessels, it is more nearly like the Oneota complex at the nearby Mero site than any of the type sites for the Grand River Focus. Like the Mero site, Porte des Morts is remarkable for the number of Oneota traits that are entirely lacking--pipes, catlinite ornaments, bone tubes, ground stone celts, sherd discs, etc. The second major Oneota deposit is represented by a ceramic complex including such types as *Lake Winnebago Trailed* and *Perrot Punctate* and is on stratigraphic grounds the later of the two occupations. Whether or not there were other distinct occupations depends upon the interpretation given minor ceramic groups present in the total collection. It is probable that Porte des Morts was the site of many brief occupations over an extended period and served as a convenient stopover for people moving out into the islands north of the Door Peninsula.

Works cited:

Freeman, Joan E.
1956 *An Analysis of the Point Sauble and Beaumier Farm Sites.* Unpublished Master's thesis, University of Wisconsin.

Hall, Robert L.
1962 *The Archaeology of Carcajou Point.* Madison, the University of Wisconsin Press.

Henning, Dale R.
1961 "Oneota Ceramics in Iowa." *Journal of the Iowa Archaeological Society,* Vol. XI, no. 2, pp. 1-47.

Mason, Ronald J.
1966 *Two Stratified Sites on the Door Peninsula of Wisconsin.* Museum of Anthropology, The University of Michigan, Anthropological Papers no. 26. Ann Arbor.
1967 "The North Bay Component at the Porte des Morts Site, Door County, Wisconsin." *The Wisconsin Archaeologist,* Vol. 48, no. 4 n.s. pp. 267-345.

McKern, Will C.
1945 *Preliminary Report on the Upper Mississippi Phase in Wisconsin.* Bulletin of the Public Museum of the City of Milwaukee, Vol. 16, no. 3.

McPherron, Alan
1967 *The Juntunen Site and the Late Woodland Prehistory of The Upper Great Lakes.* Museum of Anthropology, The University of Michigan, Anthropological Papers no. 30. Ann Arbor.

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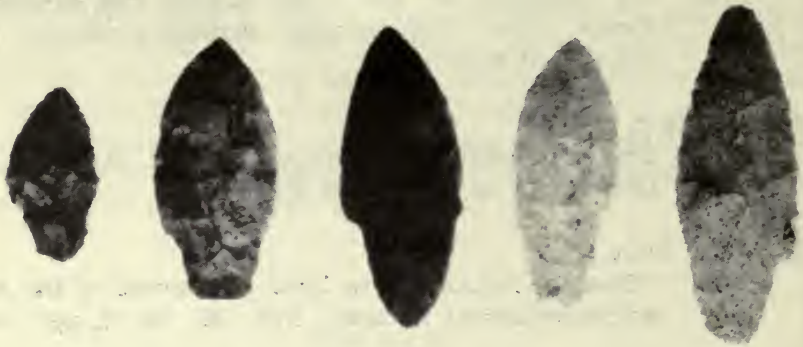

SANDIA–LIKE POINTS FROM WISCONSIN AND IOWA
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THE DAVENPORT CONSPIRACY by Marshall McKusick, University of Iowa, Iowa City, 1970. Price: $5.00, Paper, $3.00.

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HILGEN SPRING PARK MOUND GROUP 1
by Howard Van Langen and Thomas F. Kehoe

A GROOVED AXE TYPEOLOGY 20
by William A. Smith

CONSTITUTION AND BY-LAWS 42

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HILGEN SPRING PARK MOUND GROUP

Howard Van Langen and Thomas F. Kehoe*

The following is a report of the excavation of a mound group located in the SE 1/4 of the NW 1/4 of Section 35, T 10 N, R 21 E, in the City of Cedarburg, Ozaukee County, Wisconsin. The excavation was undertaken in the summer of 1968 when it was learned that the mounds were to be leveled in the process of expanding a housing project.

After receiving the kind permission of the owner, Mr. James Callan, to salvage the site the work was begun immediately since the landscaping was scheduled to start in two weeks. As it turned out, various delays slowed down the building project and it was finally abandoned completely after having leveled only the smallest mound of the group.

The mounds were a group of three conicals located on the sloping crest of a wooded hill located 300 feet above Cedar Creek. The woods consisted of a good stand of beech with some birch and hickory. As indicated by the group name, there were several good springs in the area.

The mounds were oriented in a generally north-south direction. The largest mound, number one, measured forty feet in diameter and varied in height from six feet when measured from the natural slope level, to nine feet where it extended down into one of several depressions in the area formed by the removal of material used for mound fill.

Mound number two was oriented twenty-four feet south of mound number one and measured thirty-five feet in diameter and four feet in height.

Mound number three was oriented seventy feet south of mound number two and measured thirty feet in diameter and three and one-half feet in height above the natural surface level. A line drawn through the centers of mounds

***The senior author conducted the excavations and is responsible for this section of the report while the junior author made the analysis of the artifact material.**

number one and three, finds mound number two oriented somewhat to the west.

Each of the mounds had been disturbed by relic hunters, mound number three was extensively disturbed, and mounds number one and two were pitted at the centers reaching down to some of the burials. However, the considerable size of mounds number one and two left much undisturbed area to be excavated. Because mound number three was extensively damaged and lay in a position closest to where the building project was to start, it was not excavated. Excavation was started on mound number two first, in the hope that it could be excavated, while the least damaged mound, number one, lying farthest away from where the building project was to start, could somehow be spared long enough to permit a careful excavation.

In light of what was expected at the start of the dig, this was probably a good plan. However, had the ensuing delays been anticipated, ample time could have been found for excavating mound number three first. This would have been worth the effort as in slicing through the mound the bulldozer rolled out quite a bit of human skeletal material including several skulls that were salvaged along with one large pottery rim sherd. (Pl. 1, l)

Work on mound number two was started by laying out a grid system and clearing brush and trees from the mound. Excavation was started by taking a four foot wide cut through the center of the mound and continued by taking alternating three foot cuts from each side of the original cut across the entire diameter of the mound. This method was also followed in excavating mound number one in order to excavate the usually more productive centers of both mounds first with the intention of excavating the rest of the mound completely if time allowed.

Natural soil stratification in the area outside of the mounds consists of an average seven inch thick layer of dark humus soil at the surface. This covered a yellow sub-soil layer that varies from very thin to six inches in thickness. This is underlain by a layer of red soil averaging twelve inches in thickness and in turn is underlain by a thin layer of gravel, and then a deep layer of clear yellow sand. The very abrupt color changes between these layers of soil made them easy to recognize and interprete.

In both mounds number one and two, the Indian builders

Plate 1. Projectile Points: a-c, Knives: d-g, Gorget: h, Rim Sherds: i-l, Body Sherds: m-v.

removed the top soil layer, before construction of the mounds was started. This was very evident not only by the absence of the humus soil, but also by the absence of the

many stones of various sizes that are found in the top soil layer in the area around the mounds.

In mound number two, the yellow first sub soil layer was used as the floor of the mound. In mound number one, the first sub soil layer was also removed and the second red sub soil layer was used as the mound floor. No special attempt was made by the builders of the mound to keep the floor level. Instead, the contour of the sub soil color layer chosen for the floor was followed and not broken except for burial and fire pits and several small breaks that possibly represent test pits dug by the builders in their effort to follow the chosen color contour.

Each of the mounds was used for burial purposes. Skeletal material salvaged from mound number three represents at

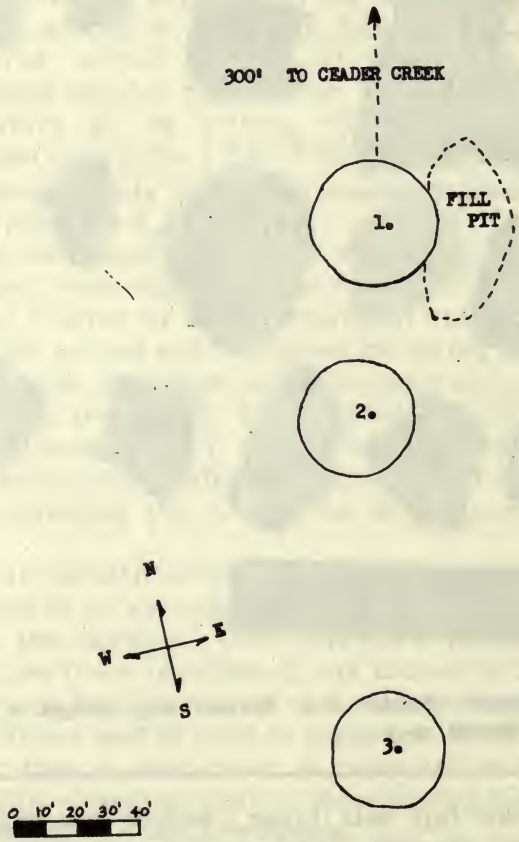


Figure 1. Hilgen Spring Park Mound Group

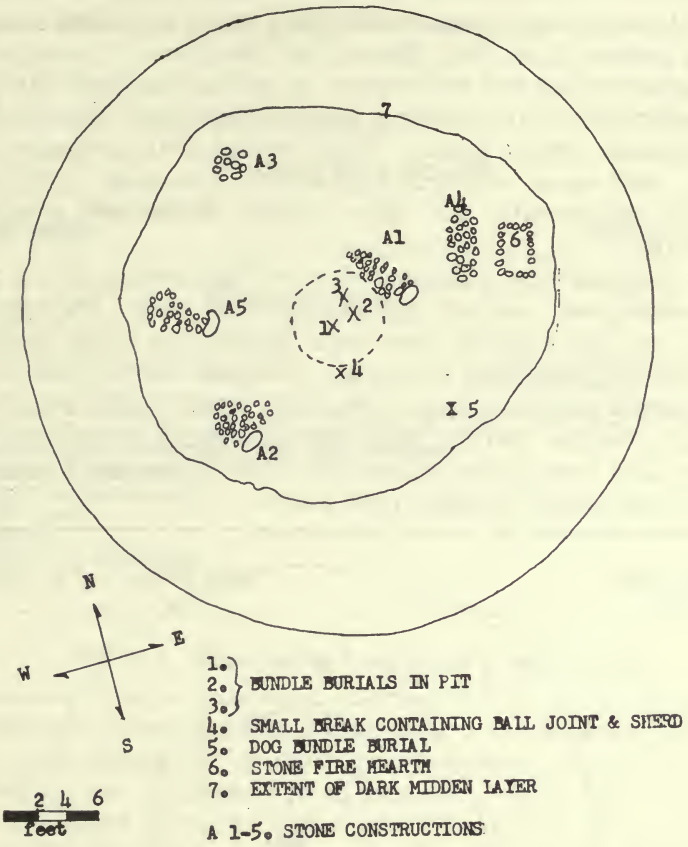


Figure 2. Hilgen Spring Park Mound 1. Plan View

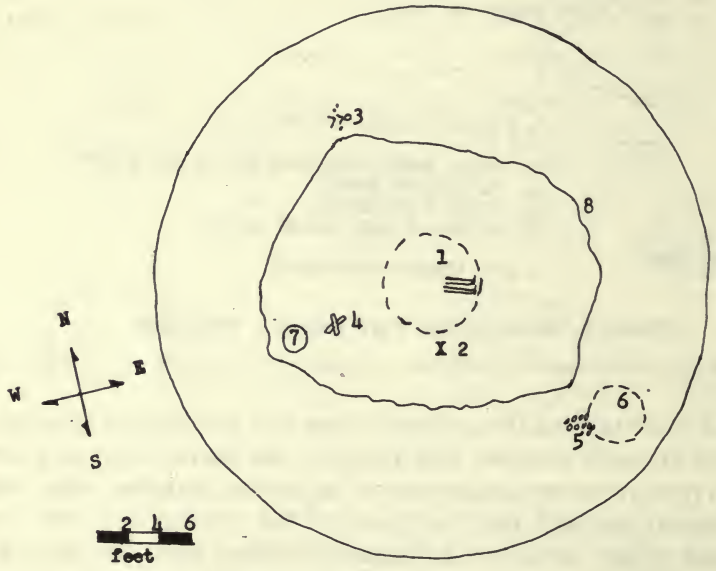
least five adults, quite probably buried as bundle burials.

In both mounds number one and two, the main burials were placed in pits at the mound centers. In mound number one, the pit was taken through the red floor of the mound and into the gravel and sand layers. In mound number two, the pit was taken through the yellow floor of the mound and into but not through the red layer. Each of the burial pits was roughly circular in outline, ran to a depth of about eleven inches and was from five to six feet in diameter.

In the pit in mound number two, the undisturbed lower leg and foot bones of an adult, primary burial in a supine position, was encountered. The rest of the skeleton had been reached by the relic hunters in their vertical pitting at the

center of the mound. Apparently they were not interested in skeletal material as they did not take the time to remove the fill to get at the leg and foot bones. In sifting through the dug-over material of relic hunters, many of the bones belonging to this skeleton were found. This burial was oriented in a general east-west direction, head to the west, and most probably represents the only burial in the pit of mound number two.

Just beyond the outside edge of the burial pit, a one-foot-in-diameter break in the mound floor was found. (Fig. 4, #2). In digging into this break, one large piece of human skull bone and a human sternum were found lying on the sand and gravel layer. Possibly these bones represent secondary bundle burial material somehow previously left unburied and then given proper burial in the mound primarily built for the single in-the-flesh burial.



1. BURIAL PIT CONTAINING LOWER LIMBS OF AN EXTENDED BURIAL
2. SMALL BREAK IN FLOOR CONTAINING HUMAN BONE FRAGMENTS
3. EXTENDED INFANT BURIAL
4. INTRUSIVE BUNDLE BURIAL
5. FIRE HEARTH
6. FIRE PIT
7. WHITE ASH FIRE REMAINS
8. EXTENT OF DARK MIDDEN LAYER

Figure 3. Hilgen Spring Park Mound 2. Plan View

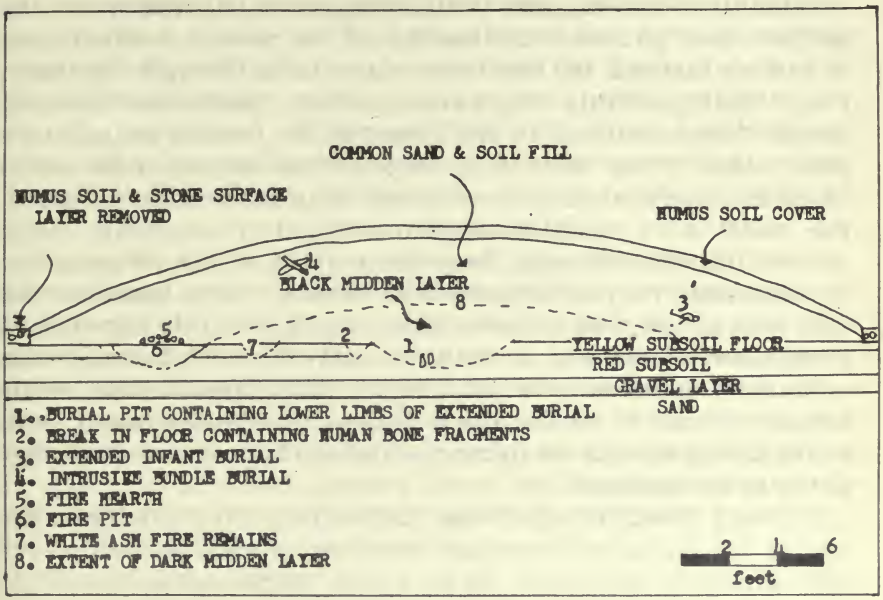


Figure 4. Hilgen Spring Park Mound 2. West Profile

The remains of a child that died at or shortly after birth was also found in mound number two. (Fig. 4, #3). The skeleton was oriented in a generally east-west direction with its head towards the east. The child was buried in a supine in the flesh position and located to the northwest of the burial pit and nine inches above the mound floor. Burial in this position, somewhat removed from the burial pit, may reflect a lack of status for this burial. However, grave goods to be described later were found with this burial indicating some status and it is more likely that the child died while the mound was being constructed and was included in the remote position.

Another burial found in mound number two was inserted sometime after the mound was completed, as an intrusive bundle burial. (Fig. 4, #4). The burial was placed one foot below the top of the mound. A rim sherd (Pl. 1, k) of pottery found with this burial is foreign to the type of pottery found in the undisturbed area of the mound and represents a group of people other than the builders of the mound.

The burial pit in mound number one was also reached by relic hunters and some of the burials were disturbed.

At least three bundle burials were represented in the undisturbed part of the burial pit in mound number one. In sifting through the dug over material of the relic hunters, bones that probably represent another bundle burial were found. The condition of the bones of the bundle burial were poor. Also found in sifting through the dug-over material were bones in a very good state of preservation including the skull of a round-headed individual (in contrast to all other skulls found being long-headed). It is very frustrating to speculate on material worked over by relic hunters. But this well preserved round-headed skull probably represents an intrusive burial inserted quite some time after completion of mound number one. As such, this speculation, while adding nothing to an attempt to understand these mounds, will at least not distort the picture obtained from the undisturbed parts of the mound.

A very small break in the mound floor at the edge of the burial pit contained one ball joint, one small pottery sherd and a small piece of charcoal. This again, possibly represents bundle burial material found by the mound builders after the burial pit was filled, and inserted with the pot-sherd, for proper burial.

In both mounds number one and two, the burials, burial pits and other features, and a considerable area at the centers of the mounds were covered with a fire blackened soil layer. It measured as much as 18 inches in thickness at the center and diminished in thickness towards the outside. It contained much midden material including many flint flakes and cores, snail and clam shell, antler and deer bone and teeth, fragments of human mandible, charred bone, worked bone, red ochre, potsherds, bits of charcoal, fire cracked stone, broken implements and polished stone.

The material was packed very compactly around the burials and there is no doubt that it was intended as a special stratification covering for the burials, separating them from the common sand and soil fill used to complete the mounds. There can be some speculation as to where this material came from. The midden material found in this layer is what one would expect to find on the surface of a camp or village site. The very uniform blackness of the layer indicates it came from an area subjected to a great amount of fire action. Such an area could very well be a part of a camp or village set aside for temporary scaffold burials or

temporary burials in the earth until such proper time as the remains were placed in a permanent mound burial. Such a temporary burial area would no doubt be subject to many fires and would serve as a source of material suitable for covering burials in the mound. The proper location chosen for the mound would not necessarily be close to the habitation site and could possibly represent accumulated deaths over a period of several years from different camp sites.

There was a marked absence of any large pieces of charcoal that would normally be present in such fire strata. Small tools and containers used to dig and transport this material would enable the builders to remove the charcoal and any other material that they felt should not go into this burial layer.

It would also follow that material found in this layer if not specially included would at least not have been rejected as undesirable and probably represents cultural material associated with the builders of the mounds.

This black midden filled layer was the only special stratification in mound number two. Above this layer mound number two was completed largely with clear yellow sand. However, mixed materials representing all the top and sub soil layers was used for mound fill to some extent.

Mound number one above the black midden layer was made up more completely of the clear yellow sand. This may have been the special intention of the builders of mound number one, or it may reflect the fact that the pits formed by getting fill for mounds number two and three was present when mound number one was built. Then a good supply of yellow sand would be available without the need of going through the top and sub soil layers. In mound number one, in addition to the dark midden layer, a special golden color sand layer was used in association with stone constructions. These special sand stratifications were about three inches in thickness and were from five to six feet in diameter. They occurred on top of or inside the dark midden layer.

The five stone constructions found in mound number one were of several sizes and locations as follows. Construction number one was made up of mixed types of fieldstones and limestone of various sizes. A stone much larger than any of the rest was placed in a point or base position in the construction. It was a multi-colored beauty that very likely was specially chosen by the builders of the construction.

This construction was laid on the midden layer five inches above the mound floor, on the north east edge of the burial pit, and measured five and one half feet in length, two feet in width and one and one half feet in height. The stones were carefully placed to form a compact well shaped form. The entire construction was covered with the dark midden layer.

Construction number two was made up of various types of field stones and limestone, and as in construction number one, an extra large base stone beautifully rough and bicolored was used. This construction was placed across the burial pit from construction number one about five feet back from the opposite edge of the burial pit. A roughly circular three-inch layer of a golden color sand was found directly below this construction. A six-inch thick layer of the dark midden was below this. Construction number two was of more loose and not as precise in out line as construction number one. It appeared that some of the top stones from this construction may have been toppled accidently, possibly in the process of covering them with fill. This construction measured five feet in length, three feet in greatest width and fifteen inches in height, and was also covered with the dark midden material.

Construction number three was made up of nine stones laid in a circular outline two feet in diameter. The stones were about the size of a football, and consisted of four limestones and five field stones, one a very bright red and one of a beautiful green color. It is quite probable that these stones were not just chosen at random. This construction was placed about eight feet from the outside edge of the mound to the northeast of the burial pit and six inches above the mound floor. The construction was placed on a three inch layer of golden sand and this in turn underlain with a three inch dark midden layer. The construction was also covered with the dark midden layer.

Construction number four was made up of a single layer of various sizes of field stone, sandstone and limestone five feet long and one and one half feet wide. This construction was located one foot above the mound floor and about six feet to the east of the burial pit. The construction was laid on a five inch layer of dark midden material. This was underlain by a two inch layer of golden sand, and this underlain by a five inch layer of dark

midden material. This construction was covered by the yellow sand fill material.

Construction number five was made up of various sizes of fieldstones and limestone. An especially large base stone of rough limestone was present. This construction was about four feet long, from two to three feet wide, one foot in height and roughly oval in outline. This construction was located to the northwest of the burial pit and extended to within eight feet of the outside of the mound. The construction was built on and covered with yellow sand fill and placed about two feet above the mound floor. The top stones of this construction extended to about five inches below the top of the mound.

There can be no doubt that these constructions were an important part of the ritual connected with the building of these burial mounds. It appears that all the constructions were built after the burials in the pit had been placed and covered with the dark midden material. The various positions of the stone constructions in relation to the burial pit, in distance and height, indicates that the ritual did not stop with the covering of the burials but continued throughout the building and completion of the mounds.

No one special function can be attributed to all of the stone constructions. No one of the constructions was directly associated with fire. The floor of the mound directly below construction number two was blackened from a fire. Directly to the east of construction number four, a fire hearth was encountered lying on the mound floor. The hearth was outlined with limestones and measured three feet wide and four feet long. A good amount of charcoal was the only thing found on this hearth.*

Skull fragments were found between the stones of construction number two. A human tooth, human finger bone, one small fragment of bone, several flint flakes and three snail shells were found among the stones of construction number five. No material was found directly among the stones of the other stone constructions.

Construction number two was covered with dark midden

***Charcoal from this hearth was submitted to the radiocarbon laboratory at the University of Wisconsin and dated 460 B.C. (2410±55, WIS-354). It is listed in error as from Mound 2 in Bender, Bryson, and Baerreis 1970, p.337. The date is considered too early for an Effigy Mound Complex site.**

material and we cannot overlook the possibility that the skull fragments could have just been included in this material. However, construction number five was covered with the yellow sand fill that was largely sterile, pointing out that the material on construction number five, and quite possibly that on construction number two, was purposely deposited by the builders.

A concentration of one hundred and ninety flint flakes was found in a one foot cubic area in the midden layer in close association with construction number one. No such concentration appeared anywhere else in the mounds.

The mound floor near construction number four had an area of discoloration from some humus material.

Unbroken, well made or crude artifacts, and broken artifacts, were found in very close and relatively close association, on a common level with, and above and below the stone constructions. It is possible that some if not all of these materials were placed in the mound as grave offerings, or could just be material included in fill dirt from the borrow pit. It may seem dubious to suggest that broken artifacts would be included as grave goods; however, it is suggested as well as the possibility that the artifacts were purposely broken before being placed in the mound. Two artifacts, one broken and one complete (Pl. 1, c) were found in the usually sterile sand above construction number four; it seems very unlikely that these were not purposely placed.

Pottery sherds were found above and below in close association to the stone constructions and other features of the mounds primarily in the dark midden layer, but occasionally in the yellow sand fill, and in areas remote from any feature. No whole pots were found, usually single pieces and sometimes several pieces from one pot were found together. A single rim sherd (Pl. 1, k) was found with the bundle burial in mound number two, a single piece of pottery appeared deep in the ash of a crematory fire, a single piece with the ball joint buried at the edge of the burial pit. This would seem to suggest that a single sherd of pottery may have been significant to the Indian of this time and that their inclusions in the mound cannot be written off as accidental and may represent pottery associated with the builders of the mounds.

Another feature found in mound number one was a dog burial (Plate 2). The dog was not buried in the flesh but as

Plate 2. Dog Maxilla: a, Dog Madible: b-c.

a bundle burial. The burial was located in the yellow sand fill two and one half feet below the surface of the mound and twelve feet from the outside of the mound. One of the few potsherds found in the sand fill appeared near the dog burial. The reason for the inclusion of this dog burial is to be pondered. Had it been buried in the flesh, its inclusion as a sacrifice would seem feasible. Buried as a bundle burial, it would not seem to be valid as a sacrifice. More probable is that for some reason the dog was attributed enough status to be included in the remote location in the mound.

Mound number two did not contain any stone constructions of the type found in mound number one.

A hearth of fire blackened and cracked stones was found on the floor of mound number two five feet from the outside edge of the mound. The hearth was made of a single layer of stones, and was roughly oval in outline measuring two feet by one and one half feet. This hearth had a good quantity of charcoal but no other material was found on it. The hearth was placed at the edge of a four-foot-diameter fire pit that ran to a depth of one foot below the mound

floor. The pit was filled with blackened soil and charcoal from successive fires and contained scattered fire cracked stone and one small potsherd. The yellow sand fill around the outside diameter of this pit was blackened from its fire indicating the fire was burning as fill was brought up to it. It is possible that this fire area was used through the period of the building of the mound and covered in a final completion of the mound.

Across the mound from this hearth and pit and nine feet from the outside edge of the mound another fire remains was found. This fire had a precisely circular diameter of eighteen inches and left a very white ash layer five inches in thickness. No trace of charcoal was present. The subsoil for a few inches below the ash was turned a very bright red color indicating an intense heat from this fire. The ash contained one potsherd, (P1. 1, p) one small piece of charred bone, and a few flint flakes. The remains of this fire was covered with the black midden layer and made a very striking color contrast between the very precise layers of black, white and red. It is quite probable that this was a crematory or sacrificial fire. The piece of charred bone found in the ash indicates an animal material of some kind was burned but the consumption of the material was so complete that no identification could be made.

CULTURAL MATERIAL*

Stone Artifacts–

There was a total of 19 stone artifacts found while digging the burial mound. Three complete and two broken projectile points were found in various parts of the mound. One distinct point type recognized in Wisconsin was present– A Fox River Valley Stemmed Point.

The complete Fox River Valley Stemmed Point, (P1. 1,c) made of white chert, has a length of 45 mm., width 27.0 mm., and thickness of 8.0 mm. The stem length is 10 mm. and base width 13.0 mm. It has a trianguloid blade, sloping shoulders, contracting stem, and irregular fractured base. There is no evidence of grinding. Flake scars are deep and

***The entire artifact and skeletal material as well as the excavation records have been donated to the Milwaukee Public Museum.**

irregular suggesting a hard hammer percussion method of manufacture. The basal stem of the same type point was found in the midden layer of mound 1. It is made of white chert, and the stem is 15 mm. long and 18 mm. wide, and thickness is 8 mm. The base is straight to slightly convex, and is not altered showing the original cortex. A large flake scar runs parallel with the stem. This type of point occurs in Archaic to early Middle Woodland complexes.

A complete Woodland type point (P1. 1, a) 41 mm. long, 18 mm. wide and 4 mm. thick, and made of grey chalcedoney, was found in the northwest corner of construction 4, of Mound 1. It is a side-notched point with a flaring convex base. The broad shallow notches are 6 mm. wide and 4 mm. deep. The distance between the notches is narrow (7 mm.), and the base (8 mm.) is narrower than the proximal end of the blade (13 mm.). There is no grinding on the convex base, rounded basal edges, and shoulders of the artifact. The blade is somewhat asymetrical. This point is somewhat like a Monona Stemmed Point (Baerreis 1953, Fig 1, a) but closer to a projectile point found at the Naomikong Point Site (Janzen 1968, P1. XVII, d-m).

One complete unclassified side-notched point (P1. 1, b) is made of pink chert with a length of 37 mm. width 28 mm., and thickness of 6 mm. The base is 20 mm. wide, straight, with rounded basal edges. The specimen has large round, deep, side-notches, 5 mm. deep and wide. The distance between the notches is 11 mm.

An incomplete point base with the break across the proximal end of the blade is made of tan quartzite. The base is slightly convex and 17 mm. wide. There is no grinding on the rounded basal corners. Broad shallow corner-notches are present giving the base the appearance of an expanding stem. The distance between the notches is 15 mm.

One end scraper-plane or gouge was found in the midden layer of Mound 2. It was made from a thick flat ovoid chert core. One end has been chipped to form a broad convex edge. This forms a 50 degree angle from the ventral unworked surface.

Twelve stone artifacts appear to be knife blades. One (P1. 1, g) has a long and slender, leaf-shaped body with a straight base, and is made of mottled gray chert. A large fire spall is removed from one side. A similar but thicker knife (P1. 1, e) with a straight base has the tip wrenched

off. Seven knives (P1. 1, f) are small ovate forms. Two are broken across the blade and the others have the tip wrenched off. The remaining two are complete. There are two broken tips from knives, or very large, thick projectile points. There is also a broken mid-section of a knife (P1. 1, d).

Six cores of gray chert show some evidence of use. Five flakes show signs of usage. Other reject flake material is present showing evidence of use. One block flake appears to be heat treated or has been in a fire.

Metallic hematite or limonite occurs as flat oval pebbles, dark red in color associated with the infant burial in Mound 2, and were found just beyond the fingers of the left hand.

An unfinished or broken three hole rectanguloid gorget (P1. 1, h) of green chlorite shist was found in Mound 2 in the center of the collector's spoil dirt material. It is 35 mm. wide and 4.5 mm. thick. It's incomplete greatest length is 75 mm. Two holes, equally spaced from the sides, are drilled completely through the gorget and a third is evident in the break. One is 35 mm. from the end and the other an additional 24 mm. from the first, and the third 15 mm. further. The holes were drilled with a solid drill from each side leaving a cone shaped hour glass-like hole. It is similar to the Thiensville gorget (Ritzenthaler & Quimby, 1962, Fig. 123).

Ceramic Artifacts-

Seventy potsherds were found scattered in the three mounds with the largest concentration of 35 sherds associated with Construction 5 in Mound 1. Seven of the total were rim sherds. These were described, except for one rim sherd associated with an intrusive burial, as the Hilgen Spring Ware. The method of construction is the patch method of building up a vessel by adding lumps of clay. There is lamination of the clay with longitudinal splits indicated. Sherds are extremely friable and easily crumble especially when wet.

Tempering is of crushed granitic rock. Fine silica grains and mica occur probably as natural inclusions in the clay. Temper size ranges from 0.5-2.5 mm. in size and shows through the exterior and interior paste. The exterior is moderately smooth and the interior moderately rough to touch. Hardness ranges from 2.0-2.5, and color reddish

brown 5YR 5/3 to brown 10YR 5/3 on the exterior.

The surface finish, showing no luster, was paddled with an instrument wrapped with cord 1-2 mm. wide with possible braiding and an S-twist in the cord (Pl. 1, n). One type of Hilgen Springs pottery has been smoothed over by vertical wiping with grass when the clay is partially dry (Pl. 1, p-u).

The vessels are completely undecorated with the exception of two lips of the cord marked rim sherds. Diagonal notches or flutes are made in damp clay using the plain edge of a pointed stick 2.5 mm. apart (4 mm. wide and 1.5 mm. deep). These are inserted from the interior with the right hand, slanting slightly toward the left and terminating 1.5 mm. from the exterior edge of the lip. The decorated rimsherds are 9 mm. thick. One sherd shows possible evidence of incising in a "V" pattern over cord roughening (Pl. 1, v).

A minimum of four vessels are represented in the sample but the sample of sherds is too small to reveal the exact size and shapes of the vessels. They were probably large conoidal or possibly flat based vessels with vertical rims. One base flange is present. The lips were thick (12 mm.), smooth and flat at right angles to the rim with a 45 degree bevel on the interior. One variety had a rounded to angular lip. Another variety (Pl. 1, l) had slight interior and exterior extruding of the flattened lip plus the interior lip bevel. Wall thickness ranged from 5.0 to 14 mm. and averaged 7.0 mm.

There has been no previous type descriptions of this pottery. It is believed to be of Early Woodland affiliation.*

The rim sherd (Pl. 1, k) associated with the intrusive burial is split longitudinally. Tempering is angular feldspar and ranged from 2.0 mm. to 8.0 mm. in size and does not show through the exterior paste. Hardness is 2.5, exterior color reddish brown 5YR 5/3, and it does not crumble. Surface texture is moderately smooth on a plain surface. The lip is extruded 2 mm. on the exterior and decorated by a scallop 2 mm. deep by thumb pressure on a two strand

***Dr. James B. Griffin of the University of Michigan examined the pottery and recognized Early Woodland affiliations. Dr. David A. Baerreis of the University of Wisconsin feels the radiocarbon date is in agreement with the pottery and other artifacts.**

Z-twist cord. The cord strand is 0.5 mm. wide. A 2 mm. boss resulting from an interior punctate with a round ended stick 7.0 mm. in diameter occurs 20 mm. below the rim. Cultural relationship of this specimen is unknown.

INTERPRETATION

The three conical mounds excavated at the Hilgen Spring Park present an intriguing situation. If the radiocarbon date of 460 B.C. (WIS-354, 2410 ± 55 b.p.) is valid, Mound 1 is the oldest constructed burial mound in the state of Wisconsin and dates an Early Woodland mortuary complex. The dog burial, extended human burial in a central pit, ceramics believed to be of Early Woodland provenience, and some of the point types give support to this. A three hole rectanguloid gorget, metallic hematite flat oval pebbles associated with a burial, and the Fox River Valley Stemmed Points suggest relationship with an earlier complex. The stone constructions or so called "alters," suggest a later relationship with Effigy Mound Culture. A later type rim sherd associated with an intrusive burial supports the use of the mound by later Indians for burial purposes.

The most feasible interpretation is that the radiocarbon date is valid within the magnitude for plus and minus error of deviation, and the contents of the mound except for the intrusive burial material is in near approximation of time and cultural relationship to this date. However, the mounds could be interpreted as having a series of construction stages undetected at the time of excavation with material dating from Red Ochre, Early Woodland, Effigy Mound Culture, and the unknown late intrusive culture. A third interpretation could suggest that the radiocarbon date is too old and the artifact bearing midden is derived fill antedating the construction of the mound by many centuries and coming from a site occupied by several cultures (except for the intrusive mound material).

We hope that the Hilgen Spring Park Burial Mound group may shed some new light upon but not add additional confusion to Wisconsin's evasive but intriguing problem of burial mound complexes.

Baerreis, David A.
1953 "Blackhawk Village Site (Da5) Dane County, Wisconsin" JOURNAL OF IOWA ARCHEOLOGICAL SOCIETY Vol. 2, No. 4, pp. 5-20.

Bender, Margaret M., Reid A. Bryson, and David A. Baerreis
1970 "University of Wisconsin Radiocarbon Dates VII" RADIOCARBON, Vol. 12, No. 1, pp. 335-345.

Janzen, Donald E.
1968 "The Naomikong Point Site and the Dimensions of Laurel in the Lake Superior Region." MUSEUM OF ANTHROPOLOGY, UNIVERSITY OF MICHIGAN ANTHROPOLOGICAL PAPER NO. 36

Ritzenthaler, Robert E. and George I. Quimby
1962 "The Red Ochre Culture of the Upper Great Lakes and Adjacent Areas" CHICAGO NATURAL HISTORY MUSEUM FIELDIANA: ANTHROPOLOGY Vol. 36, No. 11.

A GROOVED AXE TYPEOLOGY

William A. Smith

INTRODUCTION

Little has been published concerning grooved axes. This study is a compilation of the data acquired by the author in personal communication, through viewing collections, and by reviewing information available in the limited amount of printed materials.

"The first incentive to the native in making a grooved ax was to obtain an implement of practical service, which could be securely fastened to a handle . . .Otherwise he would not have used grooved axes at all . . ."(Moorehead, 287). This handle, acting as an extension of the forearm, increases the force of the blow administered by the ax, allowing the user to do more work in less time.

The function of the handle in increasing delivered force is more easily understood by analogy with the modern steel ax. More wood can be cut in less time if the ax is attached to a handle than if the ax-head is used without a handle. This same principle holds true for the hafted ax and the hand-held chopper. By increasing the distance from the pivot point to the ax (the striking radius), both the striking arc and the delivered force can be increased.

By hafting his chopping tool the user increases his mechanical efficiency and decreases his expenditure of muscular energy. However, in order to haft a chopper, means must be found to secure the handle in such a way as to minimize slippage of the tool in the handle, slipping being the prime agent in destroying a haft. Securing is successfully accomplished by notching or grooving the chopper in such a way as to form a snug pocket in which to rest the handle. A notch can be easily chipped or pecked into a chopping tool. A groove may be formed by pecking directly into the ax body, by flanging above and below and no deeper than the body of the ax, or by raising a wide ridge from the body in which to peck the groove. The occurrence of chipped choppers notched on opposing sides is very widespread and most collections contain at least one specimen. It has not yet been determined if hafting was parallel to or directly across a handle, the implements being used as axes or hoes, respectively. If these artifacts were used as axes, then they may represent a transition from

the hand-held chopper to the hafted ax (Moorehead). This statement, although providing a logical origin for the ax tradition, is purely hypothetical.

The full-grooved ax, earliest in the ax tradition as it is now recognized, appears in association with pre-pottery Archaic materials about 1000 to 700 B.C. The three-quarter grooved ax, developed during the Early to Middle Woodland period (300 B.C. to 500 A.D.), in many areas entirely replaced the full-grooved ax, while in other areas the two types were coeval. Beginning around 700 A.D. a gradual change from the prevalence of the ax to that of the celt took place; the grooved ax tradition was entirely displaced in these areas by 1200 A.D. In areas marginal to the later cultural development, those areas which still retained the Woodland tradition, the grooved ax remained in manufacture although in steadily declining numbers.

In the Southwest, the Mogollon, the Anasazi, and the Hohokam culture areas, grooved axes appeared relatively late from 500 to 900 A.D. The ax tradition continued until the abandonment of the Pueblos and cliff dwellings around 1400 to 1600 A.D.

Just as environmental areas shift gradually from one to another (as Woodlands and Plains), ax distribution shifts gradually from common to scarce as one moves from an area in which axes are useful tools to an area where they are not (ie, the Woodlands to the Plains), and from one type area to another. Lines drawn on a map to show distribution, while helpful in giving a general idea, tend to be highly arbitrary and should be viewed in this respect.

Information as to exact distribution of axes is not precise and for some areas nonexistent. Consequently, boundaries shown on the map are "educated guesses" with gaps in those areas where information was not available.

The ax appears in various forms, many of which can be classified into types; however, even those classes of axes which have a similar appearance in flanges, vertical grooves, poll forms, and blade forms also possess individual characteristics of these parts, which set one specimen apart from any other. Never are two axes found with shapes exactly alike. Nor are axes similar in size. The smallest, showing wear, perfect copies of much larger axes and weighing only a few ounces, may have been used as toys or in activities where a larger ax would have been

unsuitable. Large specimens, some weighing upward of twenty pounds, have been reported for many locales (mostly in Illinois). These, too, show polish on the bit and groove which indicates use. Most axes, however, fall within a range of from three to ten pounds; axes much larger and much smaller are rare.

An ax weighing from five to seven pounds seems to be the most practical, heavy enough to deliver a forceful blow but not so heavy as to be cumbersome. If the bit is relatively sharp, as it is in the majority of specimens, an ax of this weight can cut wood easily when used in short, quick strokes, swung from the elbows and not from the shoulders (pers. comm. G. Metcalf). There is great disagreement, however, on whether axes were the primary agent in felling trees. Some authors are of the opinion that axes were used either to girdle trees (C. Rau) or to bruise and crush portions of the trunk so that fire could be used more effectively in felling the tree. The ax was then employed again to remove the burned and charred wood (A. Skinner, G. Perkins). Others feel that axes were sufficiently sharp to cut down trees without the aid of another agent such as fire (W. Moorehead, C. Brown). Champlain told of Indians, using stone axes to cut down trees for a stockade, who were able "in two hours to make so strong a defense that five hundred men could not break through without great loss." Fire could not be used in this "lest the smoke reveal their presence to their enemies" (F. Berlin). Most authors agree that axes were used in both woodworking and warfare. Moorehead cites the use of axes in soapstone quarries and for bear hunting.

SELECTION OF MATERIALS

In the selection of raw materials for a grooved ax, the prehistoric manufacturer had to apply his knowledge of geology; he had to know at a glance the equivalent of the chemical and physical properties of rocks and select the proper "blank." He knew that certain rocks disintegrated through hydration (rocks with mica or limestone) and consequently avoided these.

The manufacturer knew that certain rocks did not lend

themselves to pecking and grinding or to use as axes. Rocks with coarse crystalline structures (feldspar-quartz crystalline rocks and most porphyrys), rocks with well developed bedding planes (gneiss, schist) and most metamorphic rocks were avoided because they tend to fracture when struck solidly. Greenstone, a metamorphic rock, is an exception to this and is the second most common raw material for axes in the Woodlands. The most common rocks used for axes are the fine-grained igneous extrusives (basalt, trap, diabase, etc.). These were selected consistently for their durability; igneous extrusives are hard enough to hold a cutting edge (but not so hard as to make pecking and grinding difficult), and do not fracture easily. This preference for fine-grained rocks is also manifest in the Southwest in combination with coarse-grained, very hard specimens.

The skill of the manufacturer and the time available to him provided other bases for selection of a blank. If he were skillful or had a greater amount of time to spend, he would select a harder rock. If the form of the rock before working, the blank, closely resembled the form of the finished ax, the problem of spending much time in working down a large, jagged piece of rock to a recognizable form was much simplified or the manufacturer could ignore the odd shape of the blank and produce an oddly shaped ax; the shape of the blank often determined the shape of the finished ax.

Another time factor is the intended useful lifetime of the ax. If the ax about to be made was to serve its owner for a long time, the manufacturer would choose the best material and apply all of his skills in producing the best ax he could. However, if the ax was to serve for only one or two activities and then be discarded, he could employ less suitable materials, and use less time and skill in manufacture.

As stated before, aboriginal manufacturers showed a preference for the fine-grained igneous extrusives as raw materials for axes. Ninety percent or more of all axes found are of these rocks. The greater part of the remaining percentage are rocks with greenstone predominating. Axes of inferior materials are few, two percent or less except in locales such as the Driftless Area of Wisconsin, where suitable materials were impossible to acquire. In areas such as this the percentage is inverted with axes of inferior materials (sandstone, limestone) predominating and specimens of igneous material occupying a low percentage.

MANUFACTURE

After selecting a blank of the proper size, shape and composition, the manufacturer chose a smaller cobble of approximately equal or greater hardness, with one end rather pointed and the other round and comfortable to hold. The pointed end of the hammer-stone was struck against the blank, which smashed away a small part of the surface of the blank (and the hammer-stone) and produced a small pit. The manufacturer continued to peck away the surface of the blanks and worked out a groove and a blade. According to his own cultural tradition and taste, he produced a variety of poll and blade shapes, a full or a three-quarter groove, flutes, flanges, barbs or vertical grooves, and did or did not conform to a given pattern.

When the ax was pecked into the desired shape and size, it could have been used in its rough pockmarked form or could be ground and polished. Grinding entails the use of a suitable stone for abrading the rough surface and produces a smooth but grainy surface. Again the ax could have been hafted at this point and put to use or it could be further polished with sand until smooth and highly reflective.

Pecking, contrary to popular belief, does not require infinite patience and time. At the U.S. Nation Museum, with jasper hammerstones for shaping and quartzite for smoothing a block of nephrite, the hardest rock known, was worked into a very serviceable grooved ax and polished in sixty-six hours. A block of granite was worked into an ax in just two hours (Fowke).

H.L. Skavlem of Janesville, Wisconsin, claimed to be able to make a crude ax in five to ten minutes, a good grooved ax in forty-five minutes and a polished ax in an hour to an hour and a half. No mention was made of materials used. (C. Brown).

In any given collection the greater number of specimens will be ground, having a smooth, grainy finish, while the rest will be about equally divided between those with a rough, pockmarked finish and those with a polished surface. Many of the axes exhibiting the rough pockmarked surfaces also are crude in general workmanship. This, to some, infers greater age. This assumption is erroneous or at least difficult to prove; these crude axes were probably manufactured when emergency situations arose. The

manufacturer, not having sufficient time to select the best raw materials or to devote to the making of a fine specimen, made an ax serviceable enough to last through the activity, and then discarded it. Highly polished or very distinctive axes, on the other hand, seem to have been cherished and carried about. Axes of the Keokuk or the Michigan Barbed types, whose manufacture is very localized, have been found as much as 250 miles from the local area.

Well-made axes, after they had become dull or slightly broken, were not discarded. Evidence of resharpening of dull blades, found in many specimens, is shown by very short thin blades and large bodies above. Occasionally a damaged poll was repaired by pecking the rest of the poll down to appear symmetrical but slightly lopsided.

HAFTING

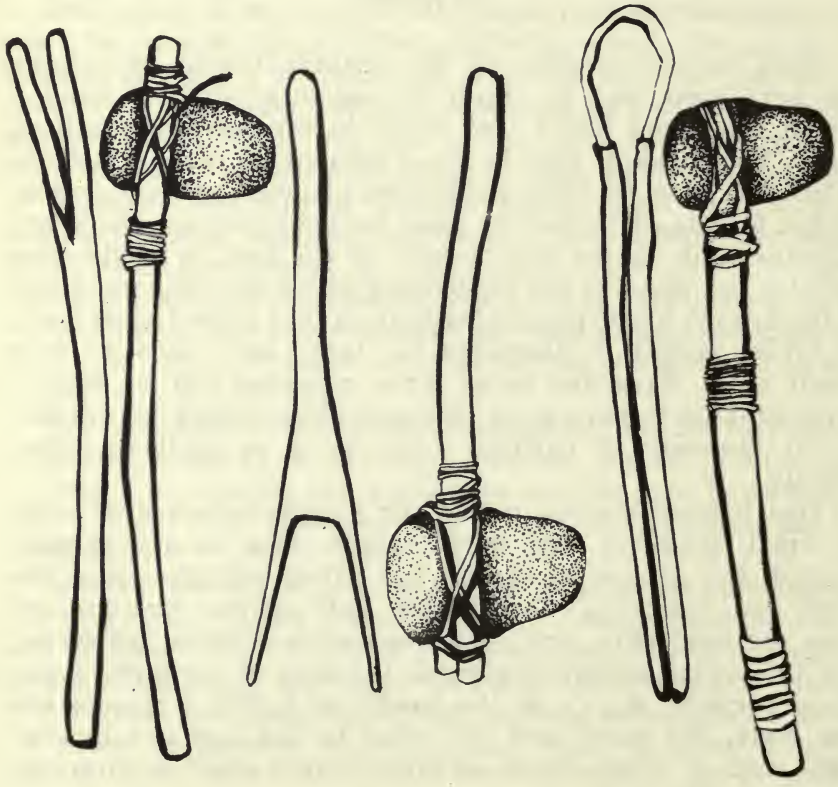
With the completion of the manufacturing processes the next step was to attach the ax to a handle. A branch had to be found which lent itself to the method of hafting used. The branch had to be green or at least pliable in order for it to be bent around the groove and form a snug pocket for the ax to rest in. This pocket could not allow any slippage; for if the ax slipped in the haft, it would soon splinter the wood or cut the binding materials. The diameter of the branch had to be great enough so that a good grip could be taken, larger in diameter for large axes, smaller with small axes. Bark and twigs were removed and the branch scraped down to bare wood. The preceding steps are common to all methods of hafting; from here on methods differ greatly.

One hafting method called for a forked stick with forks of equal diameter and equal length, long enough to pass through the groove of the ax and allow enough beyond the front for wrapping. The inside half of the fork was cut down for flexibility, and the ax was set in between the forks, one side of the groove resting in the base of the fork. A wet thong secured the ax to the handle by tightly wrapping the two ends, the base, and the sides of the fork in a figure-eight method. When the thong dried it contracted, minimizing slippage of the ax.

A variation on this method is reported by Skinner. The

Cree, living around Hudson's Bay, reported that axes were hafted by splitting a stick of sufficient diameter half way down, setting the ax in, and binding securely above and below with deer hide. Both this method and the one described above worked well for thin axes, but thick axes or axes with square corners within the groove put too much strain on the handle and caused splintering and breakage.

For thick axes a branch was suitably prepared by thinning it in the center, making it flexible, (perhaps by soaking in water), and bending it around the groove surrounding the ax tightly on three sides. This handle was then wrapped in back and in a figure-eight method around the ax. The handle itself was also wrapped with hides. Such a split handle, when the ax is struck solidly, will open slightly and then snap shut upon the skin of the hand. This



Three Handle Types:
Left: Split Branch; Center: Forked Branch; Right: Bent Branch.

problem is solved by wrapping the handle securely with a thong and covering it with a sheet of hide.

Since several branches of smaller diameter are more flexible than one of larger diameter, they can be wrapped around the ax and secured with rawhide. This method removes the problems of flexibility encountered in a larger single branch.

The Keokuk ax type presents its own particular hafting problem. Grooved on two faces only and having a vertical groove on each side, this square-cornered ax would split a wrapped or forked handle. Keyes has proposed that the use of two withes, one in each groove extending a little in front and tying of the withes together and covering the handle following the usual form would solve this problem.

AREAL DISTRIBUTION

The areal distribution of grooved axes includes the whole Mississippi Valley, Southeast and South central Canada, and the Southwest. Axes are extremely rare in Florida, on the Great Plains, and in the Ozarks. Few are found east from Florida along the Gulf Coast, north from Texas to southern Iowa, or at the headwaters of the Columbia, Missouri, and Colorado Rivers. Rare on the Pacific Coast, axes found in this area are considered by some authorities to be strays from much farther east (Moorehead).

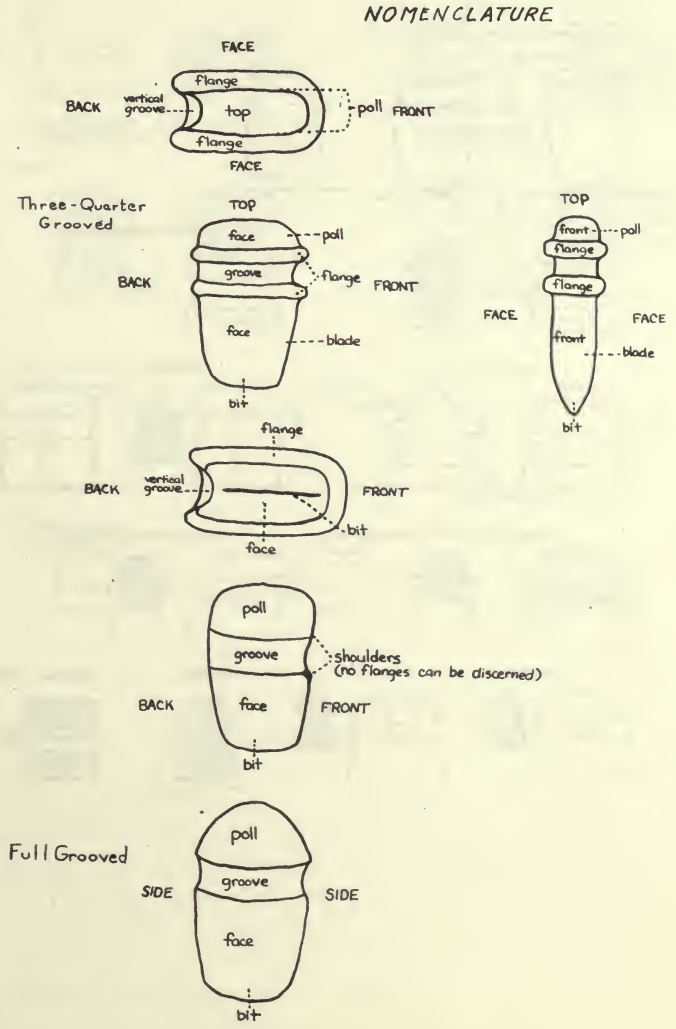
Since the grooved ax was primarily a woodworking tool, one would expect axes to be found where wood was available in prehistoric times. This is generally true although "pockets" of axless areas appear within the Woodlands and in other areas where both ample materials for ax production and sufficient wood supplies occurred. An example of this deficiency is found in the Ozarks, where the greater number of village sites have no axes, and very few sites produce only occasional specimens (Moorehead). At a village site elsewhere within the distribution area of the grooved ax, five to fifteen specimens are usually found with numbers sometimes as high as thirty.

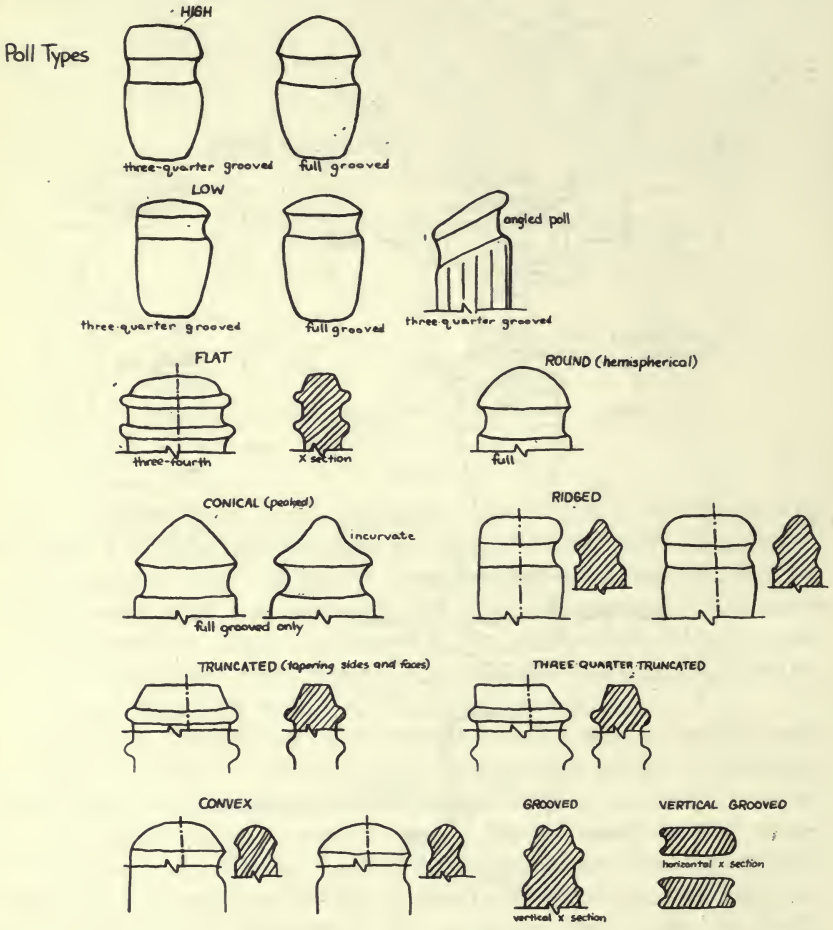
The continental United States has few areas which are truly axless, that is, areas in which no ax specimens can be

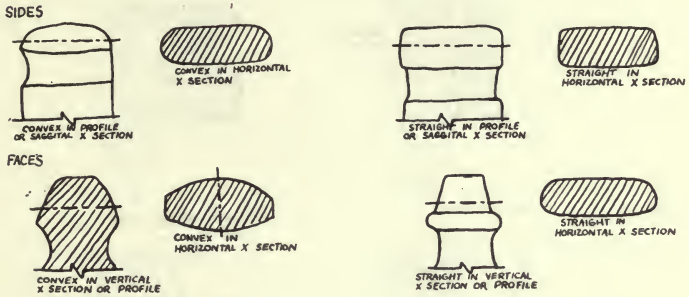
found, though they are rare on the Plains or the Rocky Mountain Plateau and tend to assume odd and varied shapes. In the midst of the "axless" area occurs an area of relative commonness and homogeneity of size and shape. This area of commonness, the Southwest, is separated from other areas of common occurrence, the Woodlands and Southeast, by several hundred miles of "axless" area.

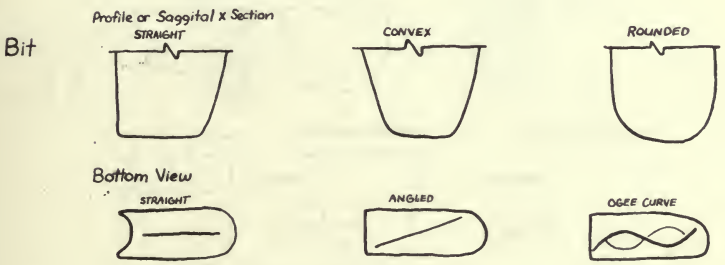
Occasional mention in historical reports of axes used by Plains Indians supports the theory that these migratory buffalo hunters acquired knowledge of the ax and its uses from the sedentary peoples in the Mississippi River area. The idea was probably carried westward by these nomadic hunters and passed on to the sedentary peoples of the Southwest who readily accepted the ax concepts from the South and East. Better materials were available here for the manufacture of axes and a wider variety of uses occurred for this tool than was the case on the plains. On the Plains, besides there being a restricted number of uses and materials, a hafted ax was an additional and bulky tool to be carried in migration and consequently was found very infrequently in the Plains tool kit. This theory of the diffusion of the ax concept is more logical than assuming

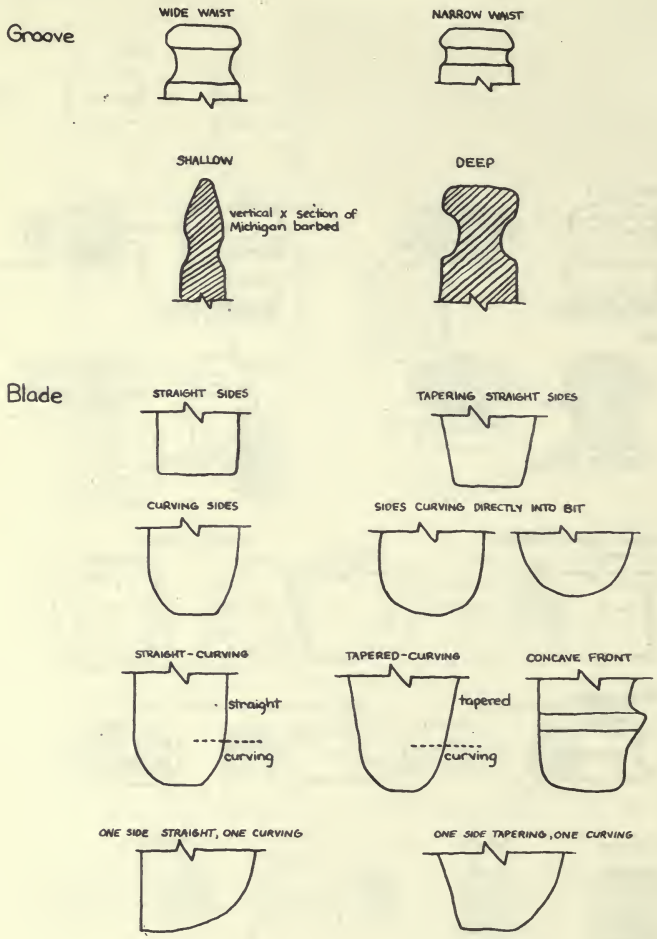
separate invention in two relatively close areas, the Southwest and the Woodlands.

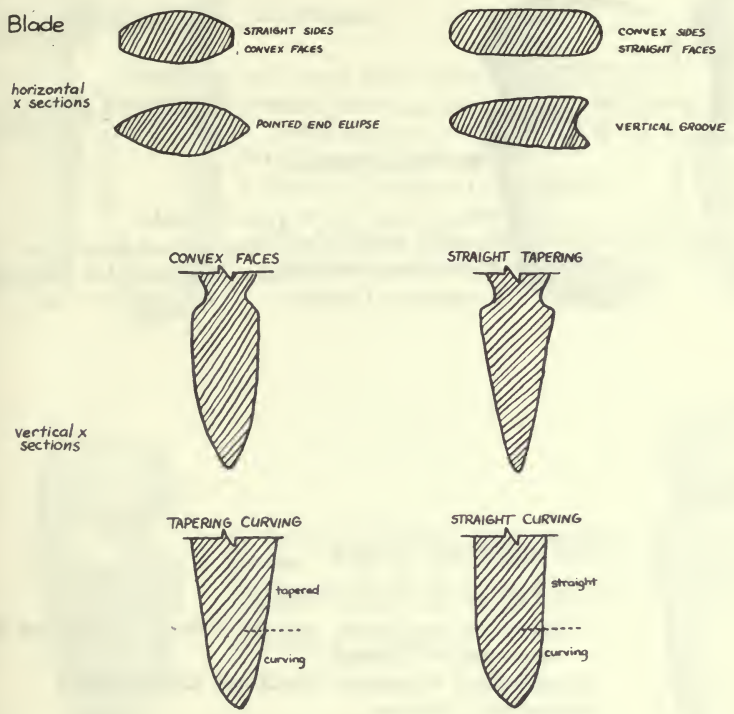



Poll Types
HIGH
three-quarter grooved
full grooved
LOW
three-quarter grooved
full grooved
angled poll
three-quarter grooved
FLAT
three-fourth
X section
ROUND (hemispherical)
full
CONICAL (peaked)
incurvate
full grooved only
RIDGED
TRUNCATED (tapering sides and faces)
THREE QUARTER TRUNCATED
CONVEX
GROOVED
vertical X section
VERTICAL GROOVED
horizontal X section


SIDES
CONVEX IN PROFILE OR SAGGITAL X SECTION
CONVEX IN HORIZONTAL X SECTION
STRAIGHT IN PROFILE OR SAGGITAL X SECTION
STRAIGHT IN HORIZONTAL X SECTION
FACES
CONVEX IN VERTICAL X SECTION OR PROFILE
CONVEX IN HORIZONTAL X SECTION
STRAIGHT IN VERTICAL X SECTION OR PROFILE
STRAIGHT IN HORIZONTAL X SECTION

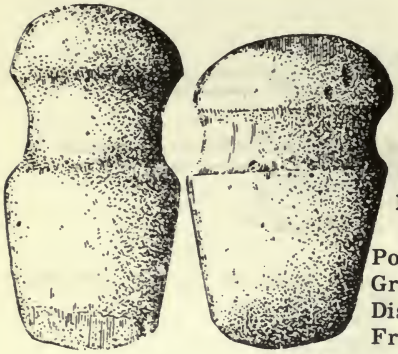

Bit
Profile or Saggital x Section
STRAIGHT
CONVEX
ROUNDED
Bottom View
STRAIGHT
ANGLED
OGEE CURVE


Groove
WIDE WAIST
NARROW WAIST
SHALLOW
vertical x section of Michigan barbed
DEEP
Blade
STRAIGHT SIDES
TAPERING STRAIGHT SIDES
CURVING SIDES
SIDES CURVING DIRECTLY INTO BIT
STRAIGHT-CURVING
straight
curving
TAPERED-CURVING
tapered
curving
CONCAVE FRONT
ONE SIDE STRAIGHT, ONE CURVING
ONE SIDE TAPERING, ONE CURVING



GROOVED AX TYPES

A. Notched
Poll, Blade, Bit: Forms variable
Groove: Two opposing notches one in each side near the top or towards the center of the ax.
Distribution: Woodlands Southeast and Southwest
Frequency: Common



B. Full-Grooved

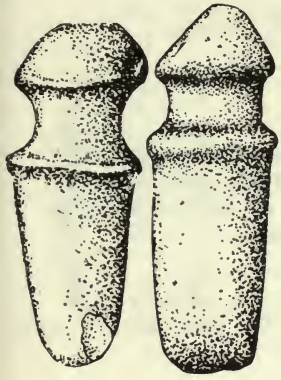
Poll, Blade, Bit: Forms Variable
Groove: Runs horizontally around body of ax
Distribution: Woodlands, Southeast and Southwest
Frequency: Common

C. Three-Quarter Grooved

Poll, Blade, Bit: Forms variable
Groove: On two faces and the front only, leaving the back flat or rounded
Distribution: Woodlands, Southeast and Southwest
Frequency: Common

D. Ovate

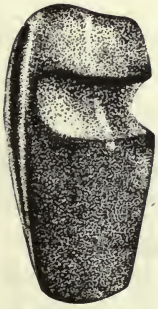
These axes are ovate in profile
Poll: usually low and rounded
Blade: contracting
Bit: convex
Groove: Three-quarter or Full
Distribution: Woodlands and Southeast
Frequency: Somewhat uncommon



E. Flanged

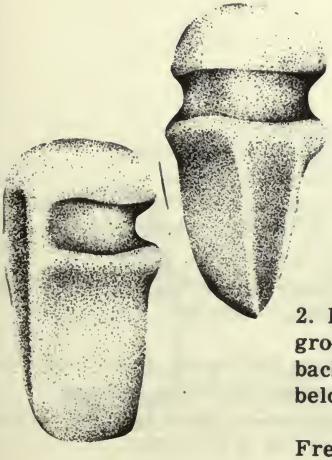
Poll Blade Bit: Forms variable
Groove: Three-quarter or full with a flange above and/or below the groove
Distribution: Woodlands
Frequency: Relatively uncommon

Several sub-types exist within the flanged category, all known from the Woodland area.



1. Vertical Groove: This sub-type always three-quarter grooved, possesses a shallow depression running down the backs from the poll to near the bit.

Frequency: uncommon

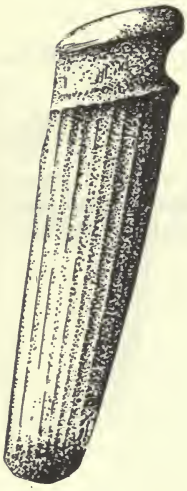


2. Double Vertical Groove: Also always three-quarter grooved, these have a shallow depression both on the back, running from poll to bit, and the front, from just below the lower flange to the bit.

Frequency: Rare

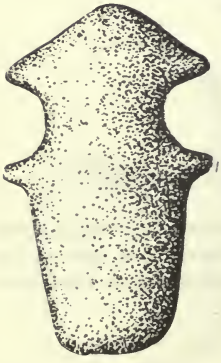
3. Four noded: This fully grooved sub-type is characterized by the four ends of the upper and lower flanges isolated on the back by the intersection of the hafting groove and vertical groove.

Frequency: Rare



F. Wisconsin Long-Bladed

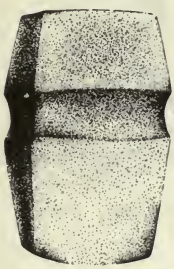
Poll: May be peaked, hemispherical, or low, flat and angled parallel to the groove, may be fluted as illustrated here
Bit: Convex
Groove: Three-quarter, angled, usually flanged
Blade: Long; back: usually straight, front: straight-curving,
Faces: straight curving, may be fluted
Horizontal cross-section: oval with flat back
Distribution: Found characteristically in Wisconsin in an area between Green Bay and the Illinois state line and from Lake Michigan to approximately 100 miles inland
Frequency: Rare



G. Michigan Barbed

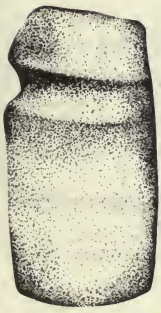
Poll: Peaked, sides concave, sides tapering
Horizontal cross-section: ellipsoidal
Groove: Full, wide, very shallow, with four projections, two on each side, one above and one below the groove. Some specimens semi-flanged
Blade: Short to long, sides and faces straight-curving
Horizontal cross section: ellipsoidal
Bit: Convex
Distribution: South-central Michigan, found only in Clinton County and counties bordering thereon
Frequency: Relatively rare within South Central Michigan, extremely rare outside of Michigan

H. Keokuk



Poll: Medium to high, flat-topped and truncated to round topped and round-sided; vertical grooves may be present
Groove: Grooved on two faces only, flanged above and below
Blade: Medium, faces tapered to slightly curved, sides straight to tapered, rectangular in cross-section
Bit: Convex
Distribution: Limited to Southeastern Iowa, west-central Illinois and a small portion of northeastern Missouri
Frequency: Relatively rare within distribution area, extremely rare outside

I. Rectangular Western



Poll: Medium to high, flat-topped and truncated, rectangular in cross section
Groove: Three-quarter, most often angled although it may be horizontal
Blade: Medium, faces tapered to slightly curved, sides straight to tapered rectangular in cross-section
Bit: Convex
Distribution: Exact distribution unknown. Specimens appear to be concentrated within 100 to 150 mile radius of St. Louis, Missouri
Frequency: Unknown

J. Southeastern

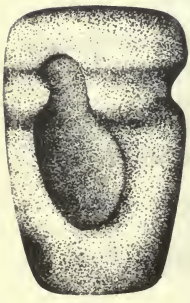
Poll: Medium height, flat-topped, faces and sides tapering, ellipsoidal in cross-section
Groove: Full, wide, shallow (ie., no deeper than and continuous with, the body outline) flanges above and below wide and flat
Blade: Medium length, broad, faces straight curving, sides straight to expanding, ellipsoidal in cross-section
Bit: Convex, continuous with body outline
Distribution: Southeast culture area
Frequency: Exact frequency unknown but form not known outside of southeast U.S.

K. Southwestern Long-Bladed

Poll: Medium height, round topped, sides and faces straight-curving, ovate in cross section
Groove: Three-quarter, flanges above and below may or may not be present
Blade: Long sides and faces tapered-curving, round cornered rectangle in cross section
Bit: Convex
Distribution: Exact distribution unknown, limited to Southwest culture area
Frequency: Unknown

L. Southwestern Hammer-ax

Poll: Low to medium, most specimens badly battered, sides and faces straight oval to rectangular in cross-section
Groove: Full wide, shallow, usually angled, slightly wider on lower right side, back deeply notched
Blade: Straight front and back, straight-curving faces round-cornered rectangle in cross section
Bit: Convex, battered and dull
Distribution: Exact distribution unknown, limited to Southwest culture area (Arizona and New Mexico)
Frequency: Unknown

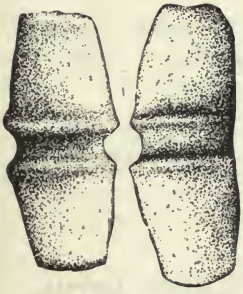


M. Pocket axes

Poll, Bit: Forms variable
Groove: Three-quarter or full
Blade: Form variable except for a shallow to deep depression in face on one side. "Pockets" may be round to elliptical with rounded to sharp margins
Distribution: Exact distribution unknown, appear to be concentrated within 100 to 150 mile radius of St. Louis, Missouri
Frequency: rare

N. Hematite axes

Poll Blade Bit: axes small in size with contracting bit, otherwise forms variable
Groove: Three-quarter or full
Axes of this type made of hematite
Distribution: In and around hematite outcrop in Missouri
Frequency: Common around hematite outcrop area, very rare elsewhere

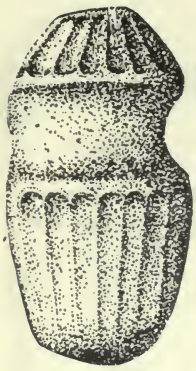


O. Double Bit

Poll Blade Bit: Two bits and, consequently no poll; forms variable
Groove: Full
Distribution: Occur throughout woodlands
Frequency: very rare

P. Double Grooved

Poll, Blade, Bit: Forms variable
Groove: Two, one above the other, full
Distribution: Occur throughout woodlands
Frequency: Very rare



Q. Fluted

Poll Blade Bit: Forms variable
Groove: Three-quarter or full
Axes of this type possess flutes on the poll or blade. Flutes are found in vertical rows, horizontal rows or chevrons
Distribution: Restricted to approximately the same area as the Effigy Mound area of Wisconsin and small portions of Minnesota and Iowa bordering on S.W. Wisconsin
(See "The Ringeisen Collection of Fluted Axes" in THE WISCONSIN ARCHEOLOGIST, Vol. 36; No. 2; June, 1955.)

BIBLIOGRAPHY

Berlin, Alfred F.
1903 Prehistoric Implements. REPORTS AND COLLECTIONS OF THE WYOMING HISTORICAL SOCIETY, Vol. 26.

Brown, Charles E.
1918 Grooved Stone Axes. THE WISCONSIN ARCHEOLOGIST, Vol. 17, No. 1 (OS), Lake Mills.

Fowke, Gerard
1913 Prehistoric Objects. MISSOURI HISTORICAL SOCIETY BULLETIN No. 1, St. Louis.

Keyes, Charles B.
1931 Grooved Axes of the Keokuk Type. THE WISCONSIN ARCHEOLOGIST, Vol. 10, No. 4, Lake Mills.

McKern, W.C. and Robert Ritzenthaler
1956 Some Varities of Grooved Axes in the Woodland Area. THE WISCONSIN ARCHEOLOGIST, Vol. 37, No. 2, Lake Mills.

Moorehead, Warren K.
1910 THE STONE AGE IN NORTH AMERICA, Vol. 1, New York.

Perkins, George M.
1885 Prehistoric Implements. THE AMERICAN NATURALIST, Vol. 15, Salem.

Pond, Alonso
1930 Primitive Methods of Working Stone-Based on Experiments of Malvor L. Skalem. LOGAN MUSEUM BULLETIN, Vol. II, No. 1, Beloit.

Rau, Charles
1876 Archeological Collections of the U.S. National Museum. SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE, Vol. 22, Washington.

Skinner, Alanson
1909 Indians of Manhattan Island and Vicinity. AMERICAN MUSEUM GUIDE, No. 29, New York.

CONSTITUTION AND BY-LAWS OF WISCONSIN ARCHEOLOGICAL SOCIETY (REVISED AND APPROVED FEBRUARY 15, 1971)

CONSTITUTION

Preamble

A meeting was held the 28th day of February, A.D. 1903 for the purpose of forming an Archeological Society Corporation under Charter 86 of the revised statutes of Wisconsin. Henry A. Crosby, Charles E. Brown, Lee R. Whitney and George H. West were present at this meeting, and the incorporation papers were prepared over their signatures in the presence of G.E. Henrick and Arthur Wenz. The first meeting of the corporation was held April 3, 1903.

Article I. Name and Location

Section 1

This organization shall be known as the Wisconsin Archeological Society.

Section 2

Its principal office shall be maintained in the city of Milwaukee, Wisconsin.

Article II. Object

Section 1

This corporation is organized exclusively for literary, educational and scientific purposes within the meaning of Section 501 (c) (3) of the Internal Revenue Code.

Section 2

It will not, as a substantial part of its activities, attempt to influence legislation, or participate to any extent in a

political campaign for or against any candidate for public office.

Section 3

On the dissolution of the corporation, the entire net assets remaining after the payment of any and all liabilities and obligations of the corporation shall be distributed exclusively for the purposes of the corporation in such manner, or to such organization or organizations organized and operated exclusively for literary, educational and scientific purposes as shall at the time qualify as an exempt organization or organizations under section 501 (c) (3) of the Internal Revenue Code of 1954 (or the corresponding provisions of any future United States Internal Revenue Law.)

Section 4

This organization is incorporated without capitol stock and is not organized for profit and no part of its net income shall inure to the benefit of any member, trustee or other individual.

Article III. Dues

Section 1

The annual dues for regular members is $5.00 if paid prior to January 1. ($5.50 if paid after January 1). This fee entitles a member to a full year's subscription to the WISCONSIN ARCHEOLOGIST.

Section 2

Sustaining membership annual dues are $10.00 Endowment membership annual dues are $500.

Article IV. Application and Acceptance to Membership

Section 1

Application for membership shall be made to the corresponding secretary.

Section 2

Each application shall be accompanied by dues for the

calendar year.

Section 3
Applicant shall be voted upon at a regular meeting.

Section 4
In the event an applicant is rejected the applicant will be notified and the dues shall be returned.

Article V. Quorum

Section 1
A quorum for a regular or special meeting of the society shall consist of no less than 15 members.

Section 2
The society may not elect officers or change the constitution or by-laws unless a quorum is present.

Section 3
A quorum for an Executive Board meeting shall consist of no less than 50% of the board members.

Section 4
The Board may not make a binding decision unless a quorum of members is polled and unless the decision has a majority vote.

Section 5
Proxies shall not be voted at any time.

Article VI. Meetings

Section 1
The society shall meet on the third Monday of each month, except the months of July and August when no meetings are held. If circumstances warrant, the president or executive board may set another date. The annual meeting shall be held in March.

Section 2
The president or executive board may call a special

meeting of the society at any time.

Section 3

A meeting of the executive board may be called by any member of the board.

BY-LAWS

Article I. Election and Installation of Officers

Section 1

A nominating committee consisting of three or more members shall be appointed by the president at the January meeting of the executive board.

Section 2

The nominating committee shall submit at least one complete slate of consenting candidates at the February meeting.

Section 3

Additional officer candidates may be nominated from the floor at the February meeting of the society.

Section 4

The election shall take place at the annual meeting in March.

Section 5

The voting shall be by secret ballot where the number of candidates exceeds the number to be elected.

Article II. Duties of the Officers

Section 1

The president shall preside at all meetings of the society and the executive board. In his absence the duty shall fall upon the other officers in the order named in Article IV of the By-Laws. The president has the power to appoint committees and shall be an ex-officio member of all

committees.

Section 2
The duties of the vice-presidents or any one of them shall be to perform the duties of the president in his absence.

Section 3
The duties of the recording secretary shall be to keep the minutes of all meetings of the society and the executive board.

Section 4
The corresponding secretary shall attend to all the correspondence of the society.

Section 5
The treasurer shall collect and disburse all monies keeping an accurate account of all such transactions and monies of the society.

Section 6
The executive board is to conduct the major portion of the society business and to make recommendations to the society on matters it cannot pass upon. The executive board cannot elect officers or change the Constitution and By-Laws.

Article III. Membership and Dues

Section 1
Any person may be elected to membership in this corporation by a majority vote of the members present at any regular or special meeting thereof.

Section 2
Any person may be elected an honorary or corresponding
Any person may be elected an honorary or corresponding, life or term, member of the society with all the privileges of not paying dues.

Section 3
Any member in default in payment of dues shall be ipso facto suspended from all privileges of membership, and if,

after notice, such default be not cured within a period of ninety days, the membership of such member shall automatically cease and terminate.

Section 4

Any member may be removed from membership by a majority vote of the members present at any regular meeting or at any special meeting of the members called for the purpose, for conduct deemed prejudicial to this corporation, provided, that such member shall have first been served with written notice of the accusations against him, and shall have been given an opportunity to produce his witnesses, if any, and to be heard, at the meeting at which such vote is taken.

Article IV. Officers

Section 1

The elective officers of the society shall be a president, five vice-presidents, two directors, a recording secretary, a corresponding secretary, a treasurer and a maximum of twenty advisors.

Section 2

The entire slate of elective officers except advisors shall constitute the executive board.

Article V. Term of Office

Section 1

The term of office shall be one year for all elective officers.

Section 2

The term of office shall run from election day to election day at the annual meeting.

Article VI. Amendments

Section 1

The Constitution may be amended at any regular or special meeting of the society by a two thirds (2/3) ma-

jority vote, provided a quorum is present, and provided further that the proposed amendment shall have been introduced at the preceeding regular meeting of the society.

Section 2

The By-Laws may be amended by a two thirds (2/3) majority vote at any regular or special meeting of the society at which a quorum is present.

Article VII. Miscellaneous Laws and Regulations

Section 1

The Society is formed for the mutual benefit of its members and the general public. Each member therefore, shall exert a reasonable effort to further the welfare of the group by obtaining new members, by attending meetings and faithfully discharging any and all duties assigned to him.

Section 2

No unauthorized person or persons may incur any expenses in the name of the society or demand payment for injury or property loss without the express permission of the society.

Section 3

The president and secretaries have the standing permission of the society to incur expenses to the extent of $20.00 for postage, printing, supplies, etc.

Section 4

The Executive Board has standing permission to incur expenses to the extent of the treasury.

Section 5

A meeting of the executive board need not be a gathering as such but merely a meeting of the minds through any commonly recognized corresponding means.

Section 6

The recording secretary shall call a special meeting of the society upon the written requests of 15 members and after notification of the membership.

ORDER OF BUSINESS

1. Call to order of Executive Board.
2. Reading of the minutes.
3. Reports of officers.
4. Proposals and election to membership.
5. Report of committees.
6. Communications.
7. Unfinished business.
8. New business.
9. Adjournment of Executive Board.
10. Reading of Board minutes to society.
11. Election and installation of officers or any society business.
12. Program.
13. Adjournment.

BOOKS RECEIVED

THE ETRUSCAN SURVIVAL by Christopher Hampton. Doubleday & Co., New York, 1970. Price $6.95.

THE ARCHAEOLOGY OF MICHIGAN by James E. Fitting. Natural History Press, New York, 1970. Price $18.95.

STUDIES IN THE HISTORY OF CIVILIZATION by Julian A. Joffe. Philosophical Library Inc., New York, 1970. Price $8.95.

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THE LITTLE WOLF SITE 51
by John R. Halsey

WINNEBAGO CULTURAL ADAPTATION TO THE FOX RIVER WATERWAY 62
by G. Richard Peske

A BURIED SOIL PROFILE AT THE SITE OF AZTALAN, 47. JE 1, WISCONSIN 71
by Manfred E.W. Jaehnig

THE BOOKSHELF 78

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Milwaukee, Wisconsin

Incorporated, 1903

For the purpose of advancing the study and preservation of Wisconsin Indian Antiquities

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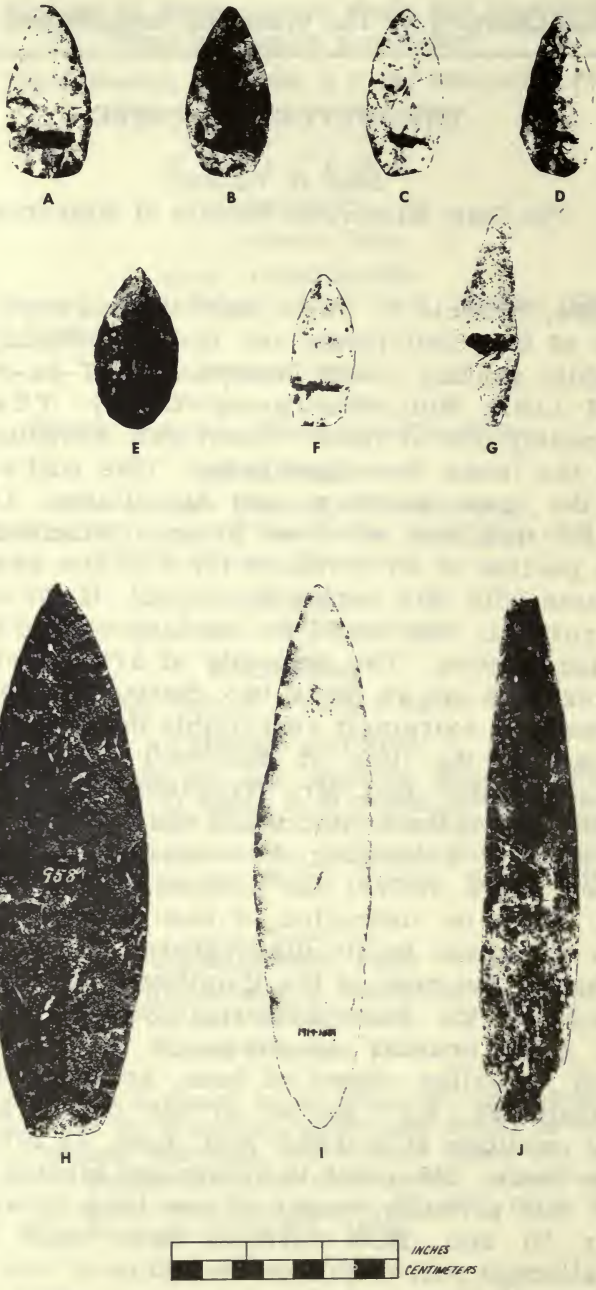
THE LITTLE WOLF SITE

John R. Halsey

The State Historical Society of Wisconsin

In 1894, Francis J. Doran and his road crew disturbed a burial of four individuals and their accompanying grave goods while grading roads in Section 16, T-23-N, R-13-E, Town of Little Wolf, Waupaca County. There were approximately 500 artifacts discovered including a copper axe and the items described below. This find was divided among the crew members and Mr. Doran. Later, Mr. Henry P. Hamilton of Two Rivers, Wisconsin, bought Doran's portion of 34 artifacts for $7. The great number of artifacts with this burial is unusual. If the estimate of 500 is correct, this would be the largest Red Ochre-like assemblage known. The diversity of artifact classes and the occurrence of at least two distinct projectile point types, make it extremely regrettable that this find was not kept intact at the time of discovery. While it cannot be proved, I assume that Mr. Hamilton made attempts to locate the rest of the artifacts and was unsuccessful. There is no way of estimating how accurately the artifacts described below reflect the composition of the original deposit, since no indication of how or on what basis the division was made by its discoverers. The material from this site and the rest of the Hamilton Collection is in the collections of the State Historical Society of Wisconsin.

The most unusual specimen in the collection is a stemmed spearlike object of bone, probably the rib of a large mammal, e.g. moose or elk (Plate 2, J). In its present condition it is 186.5 mm. long, 33 mm. wide and 4.5 mm. thick. The point is broken and blunted so that the artifact was probably longer at one time by at least 5 or possibly 10 mm. Both surfaces have badly flaked and scaled although still visible on the bottom or ventral surface are traces of cross-hatched incising which apparently


A
B
C
D
E
F
G
H
I
J
INCHES
CENTIMETERS

covered the entire surface. No such incising is present on the dorsal surface. The stem is quite neatly made and expands to a convex base. In cross section this piece is plano-convex.

Two large blades of differently colored Hixton silicified sandstone (Porter, 1961) are present (Plate 2, H, I). The largest one is lanceolate in shape and has a very slightly convex base. It is 192.5 mm. long, 57.5 mm. wide and 10.5 mm. thick. Primary flaking produced medium to large expanding flakes which meet near the center, but do not form a ridge. Secondary retouch is confined to the edges. It does not appear that this was used as a knife, since the edges are still fairly keen.

The second blade is a bipointed lanceolate. The sides are less regular in profile than the blade described above. It is 188 mm. long, 40.5 mm. wide and 10 mm. thick. The flaking technique is identical to that described above. The edges are dulled, but whether through use, as a step in manufacture or through more recent handling cannot be accurately determined. In contrast to the first blade which is gray in color, this blade is a light yellowish gray.

Two projectile points are present. One (Plate 1, A) is a large side-notched point with relatively straight sides that come to a point. It is 132.5 mm. in length. The other measurements are in Table 1. The stone is a mottled pink chert of uneven texture. Primary flaking scars are rather small and along the edge tend to hinge out at a millimeter or less up onto the blade. This has created a rather thick, blunt edge on both sides of the point. The base is very slightly concave. There is neither basal nor notch grinding. The point is biconvex in cross section.

The second projectile point (Plate 1, B) is a well-made expanding stem point of medium size. The stone type is again a mottled pink chert of the same color as the first point, however it is even-textured. The blade sides are symmetrically convex and terminate in nearly right-angle shoulders. The stem and convex base are heavily ground. The complete measurements for both of these points and the large bone point are in Table 1.

Eight small to medium-sized knives or blanks of Hixton silicified sandstone make up part of the collection (Plate 1, C-J). These are generally lanceolate in outline and contract near the bottom to form either a convex or straight base.

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INCHES
CENTIMETERS

Their metrical attributes are presented in Table 2. The edges are not sharp. This may be due to use as knives or as part of the manufacturing process.

The major portion of the collection consists of 21 chert knives or blanks (Plate 1, K-X; Plate 2, A-G). They exhibit the same kind of dulling from use or preparation as noted for the silicified sandstone specimens. Also like those above, the shapes are generally lanceolate and contract near the bottom to a straight or convex base. One specimen is extremely aberrant in shape, being bipointed with asymmetric edges (Plate 2, G). Viewed as a group, exclusive of the aberrant specimen, they are remarkably uniform in shape, manufacutring technique and amount of wear. The size range present shows no evidence of a bimodal distribution. Their metrical attributes are in Table 3. Both the silicified sandstone and the chert blades bore red ochre stains.

DISCUSSION

The artifacts described above belong to the divers and elaborate Late Archaic burial tradition which covered the whole northeastern part of the North American continent. Having been unable to view or locate the original specimens for similar chipped stone caches in Wisconsin, I can only suggest that the following finds may be related: the Lyons Cache (Stout, 1906, p. 257); the Schumacher Cache (Brown, 1907, p. 55); Richland City Cache No. 2 (Brown, 1907, pp. 55-56); the Fulton Township Cache (Brown, 1907, p. 56); the Tustin Cache (Brown, 1907, p. 56); the Berlin Cache (Brown, 1907, pp. 57-58); the Honey Creek Cache (Brown, 1907, pp. 58-59); the Meyer's Mill Cache (Brown, 1907, p. 60); the Reynolds Cache (Falge, 1915, p. 146); the Lyon Cache (Brown, 1916, p. 93); and the Silliman Burial (Brown, 1924, p. 73). These typically contain small (50-100 mm.) lanceolate or "leaf-shaped" blades, usually of finished quality, as opposed to crude "roughed out" blanks.

Similarities may also be noted with a burial from Port Washington (Quimby, 1957), classified by Ritzenthaler and Quimby (1962, p. 258) as a component of the Red Ochre Culture, which contained seven lanceolate quartzite blades ranging from 59 to 94 mm. in length. It is the large blades,

however that offer the most intriguing and diagnostic possibilities for correlation. The Riverside site in Menominee, Michigan (Hruska, 1967) yielded large blades of both the straight-based and bipointed varieties although these are made of dark gray flint.

Recently, in Jackson County, Wisconsin, a cache of 74 quartzite blades was found in the bank of the Black River (David Kriesel, personal communication). There are two large straight-based blades (190 and 165 mm. long). The rest range from 138 to 62 mm. in length. The smaller blades have straight or convex bases.

Outside Wisconsin, in the Middlesex Phase of Ritchie's New York sequence, there occur large and small blades of the types described from the Little Wolf burials (Ritchie, 1969, p. 203).

It is to the south, in Illinois, where the most striking similarities are found. Cole and Deuel (1937, p. 90, P1. IV) include large straight-based blades as an integral part of their definition of Red Ochre Culture.

Perino (1968, pp. 72-73) describes a "Red Ochre" point type from specimens found in association with turkey-tails in a small mound in St. Clair County, Illinois. The size range and the forms presented by the specimens illustrated indicate that nearly all the blades, both silicified sandstone and chert, could be encompassed within Perino's description.

I believe it is likely that the "Red Ochre" point as defined and illustrated by Cole and Deuel, Perino and Scully (1951, p. 9) is a variant of or companion type to the large "ceremonial" blades from such sites as Carey and Port Washington in Wisconsin and Oak Grove and Dyer in Indiana (Ritzenthaler and Quimby, 1962).

The large side-notched projectile point may be a large representative of the Raddatz side-notched type (Wittry, 1959a, p. 44). The stemmed point most closely resembles the "Table Rock" points described and illustrated by Perino (1968, pp. 96-97) and "Bottleneck" points described by Converse (1963, p. 111). It is also similar to the "side-notched" point illustrated from the Thiensville site by Ritzenthaler and Niehoff (1958).

The large bone spear is extremely unusual and I have been unable to discover anything comparable to it in bone. There are some chert and quartzite forms, however, that quite closely approximate it.

CONCLUSIONS

With its estimated 500 artifacts, the Little Wolf burial is the largest Late Archaic burial find known in Wisconsin and probably one of the largest in the western Great Lakes. Although the missing artifacts compromise any major conclusions, the following seem justified on the basis of the evidence available. The Little Wolf burial cannot be accommodated in the Red Ochre Culture AS DEFINED by Ritzenthaler and Quimby (1962) since it simply lacks too many of the diagnostic "nuclear" traits (large white blades, turkey tails, tubular marine shell beads). It is obviously closely related though and in future syntheses would probably be included with the more "typical" Red Ochre sites. It may be contemporaneous, but is more likely slightly later than most of the definitive Red Ochre sites. The evidence for chronological placement rests mainly on the dating of several of the comparative sites mentioned above. Dates on comparable material from the Riverside site range from 510 B.C. to A.D. 1. The Middlesex material dates from 610 B.C. to 352 B.C. Most estimates for the age of Red Ochre place it between 1000 and 500 B.C. Also in regard to dating, the association of the rather different types of projectile points is somewhat surprising since both types have been interpreted by other writers as being much earlier than 500 B.C. in the Archaic sequence.

The purpose of presenting this material is to help fill in the picture of Late Archaic-Early Woodland burial practices in Wisconsin. Examination of caches, when and wherever possible, such as those cited as possible relatives of the Little Wolf material may yield further surprising and illuminating associations of previously unrelated artifact types.

Table 1

METRICS OF LITTLE WOLF PROJECTILE POINTS

Cat. No.	Length	Width	Thickness	Minimum Stem Diameter	Base to MSD	Plate
1919.2702	132.5	36.0	12.5	22.5	13.0	I, A
1919.2703	62.5	25.5	6.5	11.0	7.5	I, B
1919.1474	186.5	33.0	4.5	14.5	13.0	II, J

Table 2

METRICS OF LITTLE WOLF SMALL SILICIFIED SANDSTONE BLADES

Cat No.	Length	Width	Thickness	Plate
1919.1490	94.5	30.5	6.5	1,C
1919.1491	91.5	27.0	8.5	1,D
1919.1492	87.0	28.5	7.5	1,E
1919.1493	83.5	31.0	6.5	1,F
1919.1494	75.5	33.5	9.0	1,G
1919.1497	74.0	26.0	8.0	1,H
1919.1496	57.5	25.2	7.0	1,I
1919.1495	52.5	28.5	6.0	1,J
N	8	8	8	
Sx	616.0	230.5	59.0	
$\bar{x}$	77.00	28.81	7.38	
s	15.35	2.72	1.06	
V	.1993	.0944	.1436	

Table 3

METRICS OF THE LITTLE WOLF CHERT BLADES

Cat. No.	Length	Width	Thickness	Plate
1919.1832	103.0	28.0	6.5	1,K
1919.1833	93.5	27.5	6.0	1,L
1919.1834	81.5	28.5	6.5	1,M
1919.1831	79.0	31.5	8.5	1,N
1919.1835	77.0	30.5	7.5	1,O
1919.1836	75.0	28.5	7.0	1,P
1919.1829	70.0	28.5	7.0	1,Q
1919.1837	68.0	27.5	6.0	1,R
1919.2706	68.0	27.0	6.0	1,S

1919.2704	66.0	27.0	8.0	1,T
1919.1844	64.0	28.0	6.5	1,U
1919.1846	62.5	26.0	6.0	1,V
1919.2705	60.0	28.0	7.0	1,W
1919.1839	59.0	28.5	6.5	1,X
1919.1842	58.0	29.0	7.5	2,A
1919.1840	57.5	29.0	6.0	2,B
1919.1838	56.0	26.5	6.0	2,C
1919.1845	54.0	24.5	7.0	2,D
1919.1841	53.5	28.5	7.0	2,E
1919.1932	50.5	21.5	7.0	2,F
N	20	20	20	
Sx	1356.0	554.0	135.5	
$\bar{x}$	67.80	27.70	6.78	
s	13.55	2.03	.64	
V	.1998	.0732	.0943	

BIBLIOGRAPHY

Brown, Charles E.
1905
Wisconsin Caches. RECORDS OF THE PAST, Vol. 4, Part 3, pp. 83-95. Washington.
1907
The Implement Caches of the Wisconsin Indians. THE WISCONSIN ARCHEOLOGIST, Vol. 6, No. 2, pp. 47-70. Milwaukee
1916
Archaeological History of Milwaukee County. THE WISCONSIN ARCHEOLOGIST, Vol. 15, No. 2, pp. 25-105. Milwaukee.
1924
Indian Gravel Pit Burials in Wisconsin. THE WISCONSIN ARCHEOLOGIST, Vol. 3, No. 3, pp. 65-82. Milwaukee.

Cole, Fay-Cooper and Thorne Deuel
1937
REDISCOVERING ILLINOIS. The University of Chicago Press. Chicago.

Converse, Robert N.
1963
Ohio Flint Types. OHIO ARCHAEOLOGIST, Vol. 13, No. 4, pp. 79-121. Columbus.

Hruska, Robert
1967
The Riverside Site: A Late Archaic Manifestation in Michigan. THE WISCONSIN ARCHEOLOGIST, Vol. 48, No. 3, pp. 145-260. Lake Mills.

Perino, Gregory
1968
Guide to the Identification of Certain American Indian Projectile Points. OKLAHOMA ANTHROPOLOGICAL SOCIETY, SPECIAL BULLETIN NO. 3. Oklahoma City.

Porter, James
1961
Hixton Silicified Sandstone: A Unique Lithic Material Used by Prehistoric Cultures. THE WISCONSIN ARCHEOLOGIST, Vol. 42, No. 2, pp. 78-85. Lake Mills.

Quimby, George I.
1957
An Old Copper Site ? at Port Washington. THE WISCONSIN ARCHEOLOGIST, Vol. 38, No. 1, pp. 1-5. Lake Mills.

Ritchie, William A.
1969
THE ARCHAEOLOGY OF NEW YORK STATE. The Natural History Press. Garden City.

Ritzenthaler, Robert and Arthur Niehoff
1958
A Red Ochre Burial in Ozaukee County. THE WISCONSIN ARCHEOLOGIST, Vol. 39, No. 2, pp. 115-120. Lake

Mills.

Ritzenthaler, Robert and George I. Quimby
1962
The Red Ochre Culture of the Upper Great Lakes and Adjacent Areas. FIELDIANA: ANTHROPOLOGY, Vol. 36, No. 11, pp. 243-275. Chicago.

Scully, Edward G.
1951
Some Central Mississippi Valley Projectile Points. Museum of Anthropology, University of Michigan. Ann Arbor. (Mimeographed paper.)

Stout, A.B.
1906
Summary of the Archaeology of Eastern Sauk County. THE WISCONSIN ARCHEOLOGIST, Vol. 5, No. 2, pp. 230-288. Madison.

Wittry, Warren L.
1959a
The Raddatz Rockshelter. THE WISCONSIN ARCHEOLOGIST, Vol. 40, No. 2, pp. 33-69. Lake Mills.
1959b
Archeological Studies of Four Wisconsin Rockshelters. THE WISCONSIN ARCHEOLOGIST, Vol. 40, No. 4, pp. 137-267. Lake Mills.

WINNEBAGO CULTURAL ADAPTATION TO THE FOX RIVER WATERWAY

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Within a culture area perspective, American ethnologists have placed the Winnebago in the Eastern Woodlands Area (Wissler 1938) or in the Wisconsin Wild Rice Sub-area (Kroeber 1939). Thus, the Winnebago have been culturally typed as akin to the Central Algonkians with a cultural pattern including an exploitive emphasis on hunting, fishing, and gathering of wild plants with associated seasonal movement of habitation sites and a concomitant lack of emphasis on agriculture and a sedentary existence. Such an interpretation resulted from a study of ethnographical and ethno-historical data which was accumulated after cultural disruptions brought about by European contact and the displacement of many tribes during the 18th and 19th centuries.

The Winnebago culture as seen from the archaeological data is quite different and is indicative of a more complex Mississippian pattern although not as highly developed as Middle Mississippian culture to the south and southeast. Although comparisons of Winnebago culture with Middle Mississippi and Late Woodland are informative and meaningful, the scope of this paper is limited to Winnebago culture and its relationship to its local environment.

The archaeological equivalent of historic Winnebago culture is the Lake Winnebago Focus. During the 1930's and 1940's, Midwestern archaeologists, and in particular W.C. McKern (1945), defined the Lake Winnebago Focus and historically associated this focus with the Winnebago tribe by relating their respective geographical distributions and associating historically-known Winnebago villages with Lake Winnebago Focus archaeological sites.

Although by the early 19th century, the Winnebago were scattered across most of south and central Wisconsin, all the way to the Mississippi River, the 17th and 18th century

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accounts (see Lawson 1906) place their villages in east central Wisconsin along the central portion of the Fox River which includes Lakes Winnebago, Butte des Morts, Winneconne, and Poygan. It is this geographical region in which we find the Lake Winnebago Focus. Through the centuries, the Winnebago's oral histories have been influenced by anthropologists and historians. At the turn of this century, effigy mounds were thought to be a product of prehistoric Winnebagos and this idea was inculcated into the modern Winnebago folklore. Also the Winnebago origin myths of the Red Banks homeland (an area near Green Bay) were reinforced by the historian's view of Jean Nicolet's 1634 discovery voyage to Wisconsin in which it was thought that the Winnebagos he met lived at Red Banks. However, the historical data do not adequately support this hypothesis. On the contrary, the Green Bay area was inhabited by Menominees. The connotation of the term "Red Banks" may refer to the Valders till which is prevalent in the Lake Winnebago region as well as in parts of Green Bay.

The archaeological Lake Winnebago Focus sites are found within the Wolf River-Fox River drainage basin which flows into Green Bay and abuts the Wisconsin River at Portage, Wisconsin. This river system is primarily within two major geographical provinces of Wisconsin: 1) the Central Plain Province and 2) the Eastern Ridges and Lowlands Province. (Martin 1965). The Central Plain, except where it was glaciated, is smooth but relatively infertile as a province for corn agriculture. The Eastern Ridges and Lowlands province is smooth, low, fertile, the most densely populated area of the state today, and is the richest agricultural province of the state. It is noteworthy, that the Lake Winnebago Focus is limited in its distribution to the more fertile Eastern Ridges and Lowlands Province.

What are some of the environmental attributes of this province? The eastern and western borders are delineated by two north-south oriented limestone cuestas. The western limestone ridge is the Black River and Magnesian Cuesta and the eastern ridge is the Niagaran Cuesta. Between these two topographical features is a lowland called the Rock River-Lake Winnebago-Green Bay Lowland which was the main channel of the Green Bay lobe of the Valders glacial advance. The Valders has left a heavy till bed and glacial lake deposits over much of the Lake Winnebago Focus region.

The Fox River, which at one time in history was called the Riviere des Puans or Winnebago River, drains most of the northern portion of the Eastern Ridges and Lowlands Province. The Upper Fox, which starts near Portage, Wisconsin and flows into Lake Winnebago, has a gentle slope of less than 1/2 foot per mile which is the same grade as the Wolf River from Shawano Lake to its confluence with the Fox. In contrast to the slow meandering portions of these rivers, the Lower Fox which traverses from Lake Winnebago to Green Bay and the Upper Wolf above Shawano both are rapid rivers with steep grades. The lower Fox River drops 5 feet per mile and the Upper Wolf descends at a rate of 10 feet per mile. The Lake Winnebago Focus sites are concentrated along the banks and lakes of the slower portions of these two rivers.

The culturally selected riverine-lacustrine environment is one in which the water is slow moving, shallow, and silty. Within these waterways and Lake Winnebago Focus refuse deposits, there are large quantities of fish, mollusca, and waterfowl. The most heavily exploited fish species are sturgeon, catfish, walleye, bowfin and fresh water drum. Even today, Lake Winnebago, the Upper Fox, and the lower Wolf are highly productive fishing waters as is indicated by a year around fishing season, heavy spring spawning runs, and sturgeon spearing seasons. Ducks and geese cover the water during the migratory seasons as this waterway is along one of the major migratory flyways between the South and Canada. Many early explorers noted the abundance of waterfowl in this area. Henry Schoolcraft navigated the lower Fox River in late August of 1825, and commented: "Why should I relate to you our dull progress through fields of rice - through intricate channels, and amidst myriads of ducks and water fowl" (Schoolcraft 1851:223). Schoolcraft (ibid:222) goes on to state that the lower Fox River "is serpentine, almost without a parallel; it winds about like a string that doubles and redoubles, and its channel is choked with fields of wild rice." Father Marquette's description of his travels down the Fox River in 1673 is similar to that of Schoolcraft in that he says: "The way is so cut up by marshes and little lakes that it is easy to go astray, especially as the river is so covered with wild oats (i.e., wild rice) that one can hardly discover the channel" (Thwaites 1882:156-7).

Both the preceding quotations stress the heavy growth of wild rice along the lower Fox River. This feature of the environment stands out in historical descriptions. It was not until this century that the extensive wild rice beds were eradicated. Flood control, damming, and the concomitant rise and fall of water levels has led to the demise of wild rice but during the Winnebago occupation of the area, wild rice flourished and attracted fish and waterfowl. In addition to its importance in the ecological system of native flora and fauna, wild rice was probably an important food source for the prehistoric Winnebago. Unfortunately, the archaeological work that I have conducted has not yielded grains of wild rice; however, indirect evidence in the form of postulated wild rice thrashing pits has come from Lake Winnebago Focus sites (Jenks 1901; Lawson 1902). Thus, the types of rivers associated with prehistoric Winnebago settlements are slow, shallow, meandering rivers which are silty and frequently broaden out into shallow lakes and within this habitat, the associated flora and fauna were abundant and comprised a concentrated food source for man.

In terms of the growing season, the Lake Winnebago Focus sites are within the range of 140 to 160 consecutive frost-free days which has been used (Yarnell 1964:126-137) as a minimum number of frost-free days for productive corn agriculture. Archaeological and topographical data reflect a heavy exploitation of corn agriculture by prehistoric Indians in south and central Wisconsin (Peske 1966; Fox 1959). Within this region numerous prehistoric agricultural fields have been reported and the greatest concentration of garden beds is in the Lake Winnebago Focus area. In an earlier paper, these ridge and furrow systems have been associated with the Winnebagos (Peske 1966). Extensive fields are and were encountered around Winnebago villages. In association with the villages are numerous indicators of corn agriculture which are corn kernels, corn cobs, corn pollen, scapula hoes, and the cleared agricultural fields which occur in the forested river flood plains and lowlands which rise above the river flats.

The land vegetation of Wisconsin and the Lake Winnebago Focus region has been reconstructed by John T. Curtis (1959). The floristic provinces and various plant communities which he maps geographically are based on contemporary

observable plant distributions and reconstructions of local floras from land survey notes of the middle 19th century. When Wisconsin was surveyed for township and section plats, the government surveyors described the types of local vegetation and frequently used trees, which were identified to species, as markers. Thus, Curtis compiled the copious data of plant types and distributions from the land survey records and was able to reconstruct floristic zones for a time period prior to extensive alteration of vegetation brought about by encroachments of civilization with its emphasis on lumbering, farming, and later, urban development and industrialization.

The Lake Winnebago Focus sites fall within a floristic tension zone which is comprised of a great variety of plants and associated animals. This tension zone, which is 30 to 50 miles wide, marks the border of major floristic provinces (Curtis 1959), major biotic provinces (Dice 1943) and major air masses (Bryson and Wendland 1967). At least 182 plant species, which represent different major floristic provinces, reach their range limits in the tension zone. This means that there is a vast variety of life within a narrow spatial area. In terms of ecological communities, the Winnebagos were in easy reach of prairies, oak openings, southern hardwoods, northern hardwoods, and conifer stands in addition to the riverine-lacustrine environment. They had the advantage of being able to exploit a wide range of habitats. The refuse remains consist of animal species which are indicative of numerous environments; however, faunal identifications show that nearly seventy percent of the species at one site (Lasley's Point) are either aquatic animals or animals closely associated with this habitat (Cleland 1966: 85-87). At Lasley's Point 176 birds of 181 individuals were waterfowl.

Deer and elk total 78% of the pounds of usable meat of mammals and they represent 54 of the 141 individual mammals. The tension zone was the most heavily populated deer area of the state prior to the establishment of second-growth timber and brush in northern Wisconsin and the white population pressure in the Eastern Ridges and Lowlands Province. Besides the forest and forest-edge dwelling mammals, bison are present on Lake Winnebago Focus sites. The reconstruction of the bison range in Wisconsin (Schorger 1937) places bison within central Wisconsin so

that there would have been easy access to bison; however, the excavated bison bones are all worked scapulas which could have been received through trade with western Wisconsin Orr Focus tribes like the Ioway and Oto. A good percentage of the ceramic sample from Lasley's Point are Orr Focus sherds. Late Woodland sherds are notably absent from the excavated sample. Thus, I postulate stronger social ties with Orr Focus social units and Chiwere Siouan speakers than with nearby Algonkian tribes.

The prehistoric Winnebago settlement pattern is one of sedentary villages along waterways and having an adjacent cemetery and surrounding agricultural fields. They are located in regard to immediate access to water for drinking, fishing, wild rice gathering, shellfish collecting, hunting, and travel. The fields extend a mile or more back from the villages and are interspersed with rock heaps derived from field preparation. When the fields are far from the village, the stone heaps primarily contain cultivation by-products like broken hoes and large rock. When the stone heaps are closer to the habitation sites, they also include village refuse debris which has been carried to the dumping area. The cemeteries contain numerous single, extended or semi-flexed interments which frequently have ceramic vessels and shell spoons as burial goods.

Some of the historic and/or prehistoric village sites are Doty Island, Karow, Furman, Eulrich, McCauley, Pipe, and Lasley's Point. All of these sites are on Lake Winnebago, the upper Fox River, or the lower Wolf River. Many of these sites are located at strategic travel junctions. Doty Island is situated at the mouth of the Fox River where it empties out of Lake Winnebago, McCauley is at the mouth of the Fox River where it empties into Lake Winnebago at Oshkosh, and Lasley's Point is at the junction of the Fox and Wolf rivers. The water travel routes linked the Winnebago to the northern Pre cambrian Shield via the Wolf River, to the Great Lakes via the lower Fox River and Green Bay, and to the Mississippi River via the upper Fox River and Wisconsin River.

The abundance of copper refuse reflects northern economic ties; lake trout bones indicate interaction with tribes along Lake Michigan; and catlinite, Orr Focus sherds, and bison bone are indicative of interaction to the west. Further evidence for the importance of the Green Bay-

Fox-Wisconsin-Mississippi water route for travel is the history of French, English, and American exploration in the Upper Great Lakes where this waterway was the focal line of travel.

The anthropologists' treatment of the Winnebago is to place them in a marginal culture area and/or on the northern margins of Mississippian expansion. Perhaps we should look at their ecological setting as being well centered for the exploitation of a wide variety of environments and a diversity of Indian tribes. Their cultural setting is analagous to that of the Hurons in that they were a central cog for distribution of goods between tribes over a vast area. No wonder Jean Nicolet planned a voyage to set up trading relations with the Winnebago rather than the Menominees or other Algonkian Indians in Wisconsin. He had heard of the dominant tribe of Wisconsin: the Winnebago.

BIBLIOGRAPHY

Bryson, Reid A. and Wayne M. Wendland
1967
Tentative Climatic Patterns for some Late Glacial and Post-Glacial Episodes in Central North America. In Mayer-Oakes, William J. ed., LIFE, LAND AND WATER, pp. 271-298. Univ. of Manitoba Press. Winnipeg.

Cleland, Charles E.
1966
The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region, ANTHROPOLOGICAL PAPERS, MUSEUM OF ANTHROPOLOGY, UNIVERSITY OF MICHIGAN, No. 29. Ann Arbor.

Curtis, John T.
1959
THE VEGETATION OF WISCONSIN. University of Wisconsin Press. Madison.

Dice, Lee R.
1943
THE BIOTIC PROVINCES OF NORTH AMERICA. University of Michigan Press. Ann Arbor.

Fox, George R.
1959
The Prehistoric Garden Beds of Wisconsin and Michigan and the Fox Indians. THE WISCONSIN ARCHEOLOGIST, N.S., Vol. 40, No. 1, pp. 1-18.

Jenks, Albert E.
1901
The Wild Rice Gatherers of the Upper Lakes. BUREAU OF AMERICAN ETHNOLOGY, 19th ANNUAL REPORT.

Kroeber, Alfred
1939
Cultural and Natural Areas of Native North America. UNIV. OF CALIFORNIA PUBL. IN AMERICAN ARCHAEOLOGY AND ETHNOLOGY, Vol. 38.

Lawson, Publius V.
1902
Clam Eaters and Their Shell Heaps in Winnebago County. THE WISCONSIN ARCHEOLOGIST, O.S., Vol. 2, No. 1, pp. 6-8.

1906
The Habitat of the Winnebago, 1632-1832. PROC. OF THE STATE HISTORICAL SOCIETY OF WISCONSIN, pp. 144-166.

Martin, Lawrence
1965
THE PHYSICAL GEOGRAPHY OF WISCONSIN. Univ. of Wisconsin Press. Madison.

McKern, W.C.
1945
Preliminary Report on the Upper Mississippi Phase in Wisconsin. BULL. OF THE PUBLIC MUSEUM OF THE CITY OF MILWAUKEE, Vol. 16, No. 3, pp. 109-285.

Peske, G. Richard
1966
Oneota Settlement Patterns and Agricultural Patterns in Winnebago County. THE WISCONSIN ARCHEOLOGIST,

N.S., Vol. 47, No. 4, pp. 188-195.

Schoolcraft, Henry Rowe
1851
NARRATIVE JOURNAL OF TRAVELS.

Schorger, A.W.
1937
The Range of the Bison in Wisconsin. TRANS. OF THE WISC. ACAD. OF SCIENCE, ARTS, AND LETTERS, Vol. XXX, pp. 117-130.

Thwaites, Reuben
1882
HISTORIC WATERWAYS.

Wissler, Clark
1938
THE AMERICAN INDIAN, 3rd ed. Oxford Univ. Press.

Yarnell, Richard Asa
1964
Aboriginal Relationships Between Culture and Plant Life in the Upper Great Lakes Region. ANTHROP. PAPERS, MUSEUM OF ANTHROPOLOGY, UNIV. OF MICHIGAN, No. 23. Ann Arbor.

A BURIED SOIL PROFILE AT THE SITE OF AZTALAN, 47, JE 1, WISCONSIN

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During the summer of 1967 a field crew under the direction of Dr. Joan E. Freeman and Mr. Jay Brandon of the State Historical Society of Wisconsin, and funded by the Wisconsin Conservation Commission, Department of Natural Resources, State of Wisconsin, undertook to excavate several confined areas of the site of Aztalan (47 JE 1), Town of Aztalan, Jefferson County, Wisconsin. One of the areas excavated was a very low platform mound located in the northeastern one third of the palisaded area. The mound, referred to as Mound #3, is so low that it cannot be distinguished very readily from the natural topography. It was, however, located on the early maps drawn by Judge Hyer and Dr. Lapham (see Barrett, 1933: Plates 4, 5, and 6), and had been relocated by Dr. Freeman and Mr. Brandon during the 1964 excavations at the site.

DESCRIPTION AND CLASSIFICATION

Buried under the above discussed Mound #3 was a soil which, since it had lain virtually unchanged since the construction of the mound, could serve as an indicator of microhabitational conditions of the area under the mound before the latter was built. The soil was exposed in the north profile wall of a trench dug in an east-west direction during the 1967 excavations. The following description is based on the Soil Description Form filled out at the site by Mr. Joseph A. Steingraeber, soil scientist of the U.S.D.A. Soil Conservation Service. Only the buried soil is of interest here, and the weakly formed soil of the mound fill will not be described.

The buried soil is classified as a Kibbie silt loam. Present vegetation on top of the mound is a hay crop of red clover and quack grass. The parent material consists of eolian silt over either glacial outwash or river deposited banded silts and fine sands. The physiography consists of a river terrace or a lacustrine basin between the Crawfish River and a glacial moraine. Relief is gently sloping at 3

percent, with an eastern aspect. The Kibbie silt loam is described as a somewhat poorly drained soil, and the groundwater table stood at 9 feet on July 27, 1967. Root disturbance consists of elm tree roots to a depth of 54 inches. There has been no erosion, rather, deposition has occurred at this part of the site. The permeability of the soil profile is moderate in the upper 34 inches (from the present surface), and moderately slow from 34 to 54 inches.

A technical description of the buried soil follows (refer also to Figure 1):

Alb 24-29''

Very dark grey brown (10YR3/2M) silt loam; medium moderate subangular blocky; friable; pH 6.3; abrupt, wavy boundary.

A2b 29-34''

Grey brown (10YR5/2M) silt loam; medium weak platy; friable; pH 6.3; clear, wavy boundary.

A3b 34-36''

Grey brown (10YR5/2M) loam; medium weak subangular blocky; friable; pH 6.0; clear, wavy boundary.

B21tb 36-45''

Brown (10YR4/3M) silty clay loam; medium strong subangular blocky; firm; pH 6.0; gradual, wavy boundary.

B22tb 45-54''

Olive brown (2.5Y4/4M) silty clay loam with many very dark grey brown (10YR3/2M) clay skins and organic coatings; medium strong subangular blocky; firm; pH 6.5; gradual, wavy boundary.

B23tb 54-60''

Dark yellowish brown (10YR4/4/M) silty clay loam with very dark brown clay skins and organic coatings and yellowish brown (10YR5/6M) common fine distinct mottles; medium moderate subangular blocky; firm; pH 6.5; gradual, wavy boundary.

IIC1 60-72''

Yellowish brown (10YR5/4M) fine sand; single grain; loose; effervescent; abrupt, smooth boundary.

IIC2 72-?''

Brown (10YR5/3M) laminated silts and fine sands; single grain; effervescent.

In order to classify the buried soil profile it is desirable to use two systems of soil classification: the 1949 system

and the 7th Approximation. Although the former is supposedly superceded by the 7th Approximation, the latter has not yet been universally accepted.

Classifying the buried soil according to the 1949 system would put it into the Order of the Zonal soils and the Sub-order of the light-colored soils of the timber region. In the Great Soil Group it is assigned to the Gray-Brown-Podzolic soils, and it is the Kibbie silt loam Type of soil.

In the 7th Approximation system of classification the buried soil belongs to the Order of the Alfisols for the following reasons: it has an argillic horizon; it is usually moist between 7 and 20 inches; it has a base saturation of more than 35 percent at 72 inches below the soil surface; it does not have a spodic or oxic horizon overlying an argillic horizon; nor has it plinthite forming a continuous phase within 12 inches of the soil horizon; and it does not have surface and upper sub-horizons meeting the requirements for a mollic epipedon.

The soil belongs to the Sub-order of the Udalfs because it has a mean summer soil temperature of 59 degrees Fahrenheit or more at 20 inches below the surface; it is usually moist between 7 and 20 inches and lacks a calcic horizon; it lacks the characteristics of an Aqualf, and it lacks an ablic horizon.

The buried soil has to be classified in the Great Group of the Hapludalfs because it fulfills all the requirements of a normal Udalf. It belongs to the sub-group of the Aquollic Hapludalfs because it has mottles in the B23tb horizon, is slightly gleyed in the B22tb horizon, and the A1b horizon is thicker than the typical horizon of a Hapludalf. The Family designation is fine silty, mixed mesic; and the soil is a member of the Kibbie Series. The full classification of the buried soil under Mound #3 at the site of Aztalan is Aquollic Hapludalf, fine silty, mixed, non-acid, mesic: Kibbie silt loam.

INTERPRETATION

An investigation of the literature leads to the conclusion that the buried soil at Aztalan developed under a vegetation cover of a broadleaf deciduous forest of the mid-latitude regions (Baldwin, 1927: 282; Hole, n.d.). Since the soil is somewhat poorly drained it can be stated that the deciduous forest was a mesic forest, and that sugar maples were the

predominant species of trees present (Curtis, 1959: 104). Climatic conditions under which the Gray-Brown Podzolics, or Alfisols, form are given by Baldwin (op. cit.) as a climate with a mean annual temperature of 45-50 degrees, with a summer temperature of about 70 degrees Fahrenheit and a mean winter temperature of 25-30 degrees; with about 120 to 180 average number of frost-free days per year; an annual precipitation ranging from 30 to 45 inches, rather uniformly distributed throughout the year; and with a relatively high humidity of 70-90 percent most of the time.

The buried soil, however, is not a typical Gray-Brown Podzolic, or Alfisol, because the Al horizon is 5 inches thick rather than the 2 inches defined by Baldwin (1927:297) and described by Hole and others. For an interpretation of the thick Al horizon another soil, which also occurs in southern Wisconsin and which has a dark thick Al horizon, is of importance. This is the Udoll, or Brunizem in the 1949 classification, which develops under a prairie grass vegetation and has an Al horizon 7 inches or more in thickness.

The thickness of the buried soil lies between that of an Alfisol and that of an Udoll, and therefore is interpreted to be an intergrade between the two soils. According to studies done by White, Everett and Riecken (1955:504-506), the Aztalan soil is a typical intergrade soil, more closely related to the Alfisols than the Udolls. Because of its well developed A2 horizon and strongly formed structural units of the B horizons indications are that the buried soil was formed under a deciduous forest and that a prairie was invading the area now covered by Mound #3 just prior to the construction of the mound.

Arnold and Riecken (1964:353) report that gray ped coatings are found in the lower horizons of Brunizem (Udoll) soils in areas where the prairie was invading the deciduous forests but that these coatings were absent in areas where forests were invading prairies. The buried soil at Aztalan exhibited very dark brown (10YR3/2M) clay skins and organic coatings on the ped faces in the B22tb and B23tb horizons, and an inspection of Arnold and Riecken's Figure 3 (1964:358) suggests that the horizon sequence of the Aztalan soil, including the thickened Al horizon and the grainy gray ped coatings, can be found at the very edge of the deciduous forest at which the prairie

is beginning to get a foothold.

The well-developed solum of the Gray-Brown Podzolic soil at Aztalan reaches a depth of 45 inches. This development would have taken approximately 4,500 years (Arnold and Riecken, 1964:355). It would not, however, have been necessary for a forest to have covered the area for the total span of that time. Since it would have taken about 2,075 years to form the A1-A2 horizon sequence (Parsons, Scholtes, and Riecken, 1962:494), forest vegetation covered the area for at least that length of time. A thickening of the A1 horizon from 2 to 5 inches by an invading prairie, moreover, would have taken approximately 90 years (Simonsen, 1959:154-155).

CONCLUSIONS

The buried soil located under Mound #3 at the site of Aztalan, Wisconsin, acted as a storehouse of data facilitating the reconstruction of the microhabitat at that particular area of the site. As the above discussion indicated, a deciduous forest covered the area for at least 2,000 years without interruption, and for about 4,500 years before the construction of the mound, although the area might have been invaded by a grassland between the earlier and the later date. About one hundred years before the earthwork was constructed a prairie type of vegetation gained a foothold at the spot, but this recession of the forest was probably due to man's activities rather than climatic factors.

As was mentioned above, only conditions at the spot at which the soil profile was located are reflected in the paleosol, and the reconstructed microhabitat cannot be projected over the whole site. There are, however, other buried soils still present at Aztalan. These are located under parts of the reconstructed truncated pyramidal mounds, and although these soils were disregarded during the original excavations of Mounds #1 and #2, it is hoped that any future excavations at these mounds will facilitate microhabitational reconstructions at the western margins of the site, which would then indicate whether the forests covered the complete area of the site, or whether Barrett's original postulation of an open prairie (Barrett, 1933:37-38) at the site before the aboriginal occupation is valid.

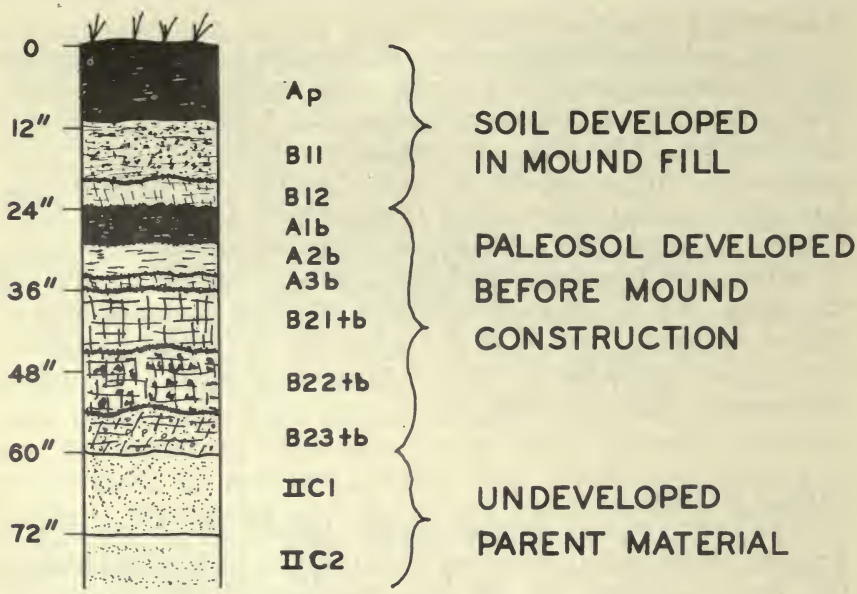

FIGURE I. SOIL PROFILE LOCATED UNDER MOUND 3 AT AZTALAN

BIBLIOGRAPHY

Arnold, R.W., and F.F. Riecken
1964
Grainy Gray Ped Coatings in Brunizem Soils. IOWA ACAD. SCI. PROC., Vol. 71, pp. 353-358.

Baldwin, M.
1927
The Gray-Brown Podzolic Soils of the Eastern United States. PROC. 1st INTERNAT. CONG. OF SOIL SCI, Vol. 4, pp. 282-297.

Barrett, S.A.
1933
BULLETIN OF THE PUBLIC MUSEUM OF THE CITY OF MILWAUKEE, Vol. 13.

Curtis, John T.
1959
THE VEGETATION OF WISCONSIN. University of Wisconsin Press. Madison.

Hole, Francis D.
n.d.
Soils of Deciduous and Mixed Forests of Mid-Latitude Regions and Mediterranean Scrub Forest Regions. In Manuscript.

Parsons, R.B., W.H. Scholtes, and F.F. Riecken
1962
Soils of Indian Mounds in Northeastern Iowa as Benchmarks of Soil Genesis. SOIL SCI. SOC. AM. PROC. Vol. 26, pp. 491-496.

Simonsen, Roy W.
1959
Outline of a Generalized Theory of Soil Genesis. SOIL SCI. AM. PROC., Vol. 23, pp. 152-156.

White, C., M. Everett and F.F. Riecken
1955
Brunizem-Gray-Brown Podzolic Soil Biosequence. SOIL SCI. AM. PROC., Vol. 19, pp. 504-506.

THE BOOKSHELF

EXPLORATIONS INTO CAHOKIA ARCHAEOLOGY, Melvin L. Fowler, Ed. Illinois Archaeological Survey Bulletin No. 7. Sixty-four figures, 10 tables, 175 pages. Urbana, 1969. $3.

Across the Mississippi River from St. Louis in southern Illinois in a fertile section of the Mississippi floodplain known as the American Bottoms is a group of over 100 prehistoric mounds collectively referred to as the Cahokia site. This is without doubt the largest and surely one of the most important aboriginal sites anywhere in the Americas north of Mexico. Dominating the site, and forming the nucleus of the Cahokia Mounds State Park, is Monk's Mound, the largest man-made structure in North America. So large is this structure--basal area of about 15 acres and a height above the surrounding plain of some 100 feet--that its artificial character was disputed well into the Twentieth Century. Naturally, such an impressive cluster of mounds has attracted amateur and professional archaeologists alike. Somewhat anomalously, and to the regret of everyone seriously interested in the archaeology of the Eastern Woodlands, the volume of literature on the site has not been commensurate with the volume of earth that has been excavated. As a result, detailed knowledge of Cahokia archaeology has been an esoteric commodity, largely passed by unpublished papers and word of mouth among those actively engaged in research in or near the site. The report under review is a commendable effort on the part of a group of Cahokia-area researchers to make available to a wider audience at least some of the results of their current endeavors in advance of the final reports which are presently caught up in the lengthy preparatory process for publication.

The volume consists of eight papers by nine different authors currently engaged in research on Cahokia data along with a Preface by the editor and a separate, comprehensive bibliography of the archaeological literature pertaining to the site. Five of the papers grew out of a symposium on Cahokia held at the 1968 annual meeting of the Society of American Archaeology in Sante Fe, while two had been published earlier in rather obscure sources and are reprinted here with some revision. The eighth

paper, by Cutler and Blake on corn from the site, was neither part of the Sante Fe symposium nor has it appeared in an earlier publication. All papers are billed as "but preliminary reports," and thus we shall evaluate them on this basis.

The opening paper, by the editor, sets the stage by describing the site's limits and major features and then summarizes the history of archaeological research at the site. A brief concluding section of this paper presents some remarks on Fowler's own recent research, which has included the preparation of a detailed map of the entire site and excavations into the spectacularly rich Mound 72. The selection and excavation of this latter mound was a direct outgrowth of the mapping project during which it was surmised that the distribution and orientation of many of the mounds followed a non-random pattern. Mound 72 was selected for excavation because of what appeared to be its strategic location along the principal north-south and east-west axes of the site's central mound group. An especially interesting discovery in this mound was a post mold one meter in diameter and 2.5 meters deep at precisely the point where the north-south axis of the site intersected the mound. Although the true meaning of this feature may never be known, its precise location relative to various geometric alignments on the site indicates that considerable care and planning must have gone into the laying out of the site by the aborigines.

The second paper is a brief report by Nelson A. Reed of his survey of the literature concerning Eastern temple mound sites, Cahokia among them, in search of recurrent patterns of intra-site mound distributions and alignments. He examined the literature on 54 sites containing 131 mounds, but found no obvious, recurrent patterns. Although detailed documentation is not provided, Reed offers a number of tentative conclusions. Among them are the observations that when plazas are present, principal mounds tend to be situated on the west sides and that the orientation of Mississippian mound groups tends to be dictated more by the local terrain than by the cardinal directions or celestial phenomena.

The next two papers, one by Warren Wittry, the other by Harriet M. Smith, are somewhat revised versions of works formerly published in the NEWS LETTER of the

Cranbrook Institute of Science and in the JOURNAL OF THE ILLINOIS STATE ARCHAEOLOGICAL SOCIETY, respectively. Wittry's brief paper describes one of the four known circular post hole alignments at Cahokia uncovered during the 1960, 1961, and 1963 seasons. The immensity of these circles--about 410 feet in diameter--makes it highly unlikely that they were roofed structures. While Wittry admits we may never know for sure what their function was, he hypothesizes from the alignments between a central post (located within 5 feet of the circle's true center) and various peripheral posts that these circles served as solar observatories. The astronomical and mathematical data required to critically evaluate Wittry's hypothesis are largely omitted from the paper, but the more we learn of this immensely complex site the less unlikely such hypotheses sound. Smith's paper, by contrast, is much lengthier and is mainly descriptive in character. The 1941 excavations in the Murdock Mound (Mound 55 on Moorehead's map of 1928) are the subject of this paper, and the focus is almost completely on the mound itself and its internal features, i.e. stratigraphy and architectural remains. The lowest levels of the mound were composted of at least 5 stages of village refuse that began with a Woodland occupation and ended with a fully Mississippian component after apparently passing through a developmental sequence. A six stage platform, with what Smith feels were elite-class residences on top, follows the village sequence and is in turn overlain by a temple mound. An impressive sequence of superimposed houses beginning with the earliest Woodland occupation are described and illustrated in admirable detail and constitute the major contribution of the report. Unfortunately, there is virtually no description of artifacts recovered in the excavations and none is illustrated. For whatever reason, during the ceramic analysis, provenience data were not recorded for individual sherds so that the great potential this site seems to hold for the Mississippian origins problem has so far gone unrealized.

The fifth paper, by James Anderson, reports on "A Cahokia Palisade Sequence." In the early stages of their current Cahokia research project, Fowler and his associates carefully studied aerial photographs of the site, some of them dating as far back as 1922, in order to gain a broader

perspective of the site. Several "white lines" observed in these photographs could not be attributed to natural phenomena and were thus suspected of being man-made, probably stockades because of their straightness and regularity. Test excavations were conducted in 1966, 1967, and 1968 (Anderson supervised the first two seasons' work) along over 120 meters of these presumed stockade lines and demonstrated conclusively that, indeed, that is exactly what they were. In places evidence for as many as three different stockade lines, each with bastions, was found. The earliest has been dated to Mississippian times ca. A.D. 1100. Here is one of the few, and certainly one of the nicest, examples of how aerial photography can further the interests of archaeological research in the Eastern Woodlands.

The sixth paper, by Patricia J. O'Brien, is concerned primarily with establishing synchronisms between the ceramic sequence of the Powell Tract at Cahokia and the Caddoan and Lower Mississippi Valley regions. A six-fold sequence of periods based on the Powell Tract ceramics, principally on the presence, absence, or stylistic changes of the type Ramey Incised, is the framework for discussion. The position of presumed trade sherds within this framework establishes the synchronisms. Since O'Brien's periods do not conform to the widely accepted, though perhaps over-simplified, sequence of Mississippian phases for Cahokia (Pre-Old Village, Old Village, and Trappist), it is unfortunate that documentation for her proposed sequence is omitted. It seems to this reviewer, as Walter Taylor justly emphasized over 20 years ago, that within-site problems should be tackled before one embarks upon cross-cultural comparisons. Thus, before inter-regional comparisons were attempted, I should think a reconciliation between the traditional and the newly-proposed ceramic sequences would be in order. This is especially so when one notes that the proposed sequence in some ways drastically contradicts the old and was defined on the basis of a methodology involving the presence or absence of traits rather than statistical fluctuations in their occurrence, a practice many would regard as a regression. We are told, for example, that the second youngest of O'Brien's six periods (V) is characterized by, among other traits, a high incidence of limestone tempered pottery and the occurrence of the enigmatic "stumpware." Yet, both of these have been

traditionally considered characteristic of the earliest not the later part of the Mississippian sequence at Cahokia. Who is one to believe? When such fundamental beliefs are called into question it seems to me that early publication of conclusions without ample supportive data is more apt to generate heat than light.

The contribution of Hugh Cutler and Leonard Blake to this volume is found in the seventh paper. In it they describe, mainly in two tables that comprise 9 of the paper's 15 pages, corn cobs excavated from various sites in the American Bottoms, throughout the wider Midwest, and into parts of the Southeast. Their basic conclusion is that, "Cahokia corn, then, follows the general pattern for this region" (p. 134), i.e. a gradual shift from small, many-rowed ears to larger, harder, 8-rowed ears. Further, "There is no evidence of sudden acceptance of new kinds of corn," a point of relevance to the age-old problem of local development versus intrusion of the Mississippian tradition.

The final paper, by James W. Porter, reports briefly on his excavations at the Mitchell site, a mound group situated within the American Bottoms about 6 miles north of what he refers to as "downtown" Cahokia. Porter's main purpose, however, is not descriptive, but is to offer the hypothesis that "a market system developed in and around Cahokia by A.D. 1100." (p. 159). Such an exchange system as contrasted with those based on reciprocity or on redistribution is presumed by Porter to be the highest rung of a 3-stage evolutionary ladder and comparable, in many ways, to that of Mesoamerican high cultures. In developing his hypothesis he relies heavily on wide-ranging ethnographic analogies and on the work of economists and economic anthropologists, especially Karl Polanyi. The archaeological evidence Porter marshalls in support of his hypothesis boils down mainly to the immense size and complexity of Cahokia, from which it is reasoned a market system of exchange must logically have existed. He also feels the site served as a "port of trade" to which and from which long-range trade caravans moved. These ideas all seem plausible enough, but can hardly be considered compelling in light of the existing evidence. What are needed now are a series of carefully formulated hypotheses to test these propositions against the Cahokia-area archaeological data via problem-oriented field research.

Overall, this monograph must be considered a welcome addition to the literature of Eastern archaeology, but, in all honesty, that statement smacks a little of the sentiment that something is better than nothing. The strengths of the report lie in its illustrations and descriptions of the total site and of various important constructional features on it - considering the maps, photographs, and diagrams, it now rates as THE source to consult for an overall appreciation of this immensely important site. However, it is definitely not the place to go for an appreciation of the kinds of artifacts found at the site, nor does it define or critically evaluate the various assemblages that have been traditionally recognized at the site. To read intelligibly at least parts of virtually every paper in the monograph, a prior familiarity with the literature on the site is thus required. The report, then would seem to be pitched largely toward those with a serious interest in Illinois archaeology. However, the glimpses it affords into the research now being conducted at Cahokia will certainly serve to whet the appetite of an even wider audience for the more comprehensive reports that will eventually follow.

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University of Wisconsin--Madison

It is with deep regret that we announce the death of one of our oldest and most faithful members, Mr. Paul Scholz, who passed away on April 25, 1971, at the age of seventy six.

Mr. Scholz had been a member of the Wisconsin Archeological Society since 1932 and he was present at most of our meetings.

He will be greatly missed and fondly remembered.

BOOKS RECEIVED

EASTER ISLAND by John Dos Passos. Doubleday & Co., N.Y. 1971. Price: $6.95.

THE DEADLY FEAST OF LIFE by Donald E. Carr. Doubleday & Co., N.Y. Price: $7.95.

-NOTES-

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THE BORNICK SITE: A GRAND RIVER PHASE ONEOTA SITE IN MARQUETTE COUNTY 85
by Guy Gibbon

A CACHE FROM JACKSON COUNTY 138
by David Kriesel

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1971 ARCHEOLOGICAL SHOW AWARD WINNERS 145

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THE BORNICK SITE: A GRAND RIVER PHASE ONEOTA SITE IN MARQUETTE COUNTY

Guy Gibbon
University of Illinois-Urbana

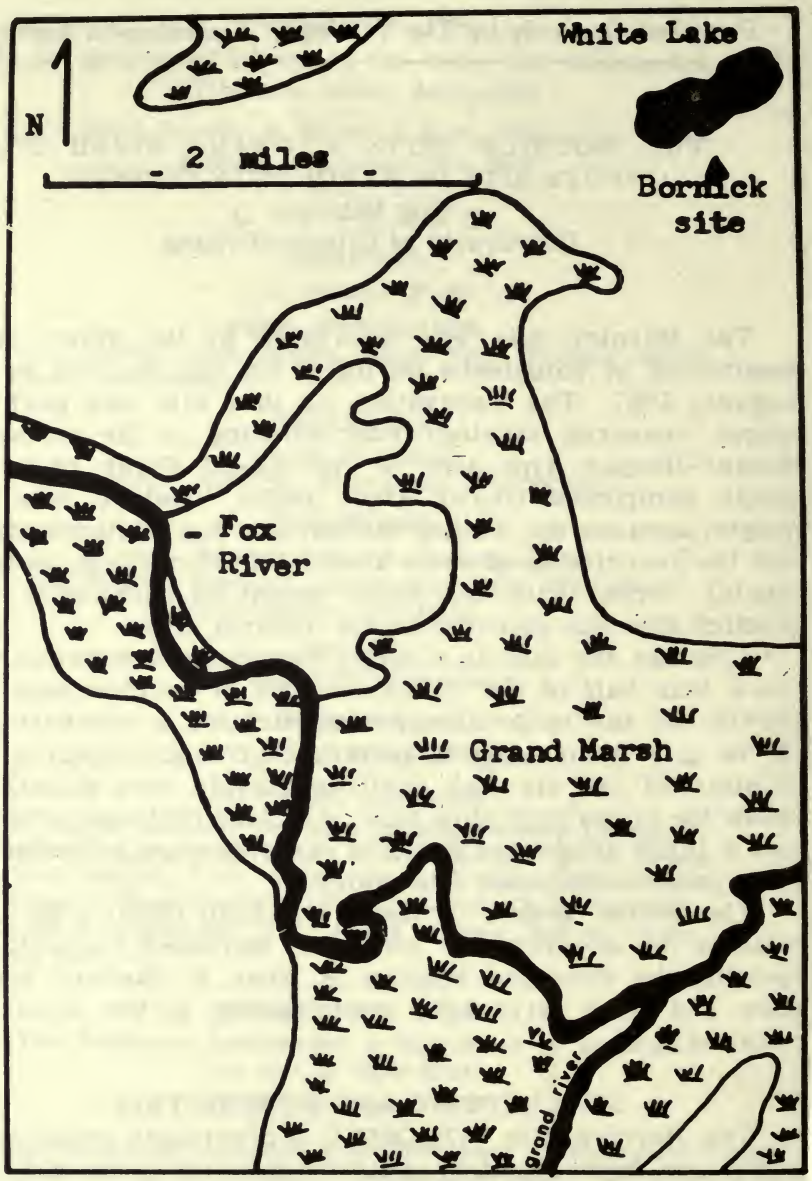
The Bornick site was excavated by the writer and a smattering of volunteers during a six day session in late August, 1967. The excavation of this site was part of a larger research strategy concentrating on the stockaded Walker-Hooper type-site of the Grand River phase. A single component Grand River phase 'control' site was sought, because the Walker-Hooper site was multicomponent and the association of some kinds of artifacts (e.g. wedges, bipolar cores) with the phase might be questioned. The Bornick site was selected as the 'control' site.

Although the site is a single component occupation with more than half of the cultural debris in the plow zone, the brevity of the excavation period dictated a concentration on in situ items. A grid pattern of five foot squares was established and six inch arbitrary levels were maintained below the seven inch plow zone. All of the dirt was screened and a large number of flotation samples were collected for later processing in the laboratory.

The writer wishes to thank Mr. Emil Bornick for permission to excavate the site, Mr. Raymond Flaherty for locating the site, and Messrs. R. Rhey, F. Jaehnig, and D. Shea and their wives for participating in the actual excavation.

SITE SETTING AND DESCRIPTION

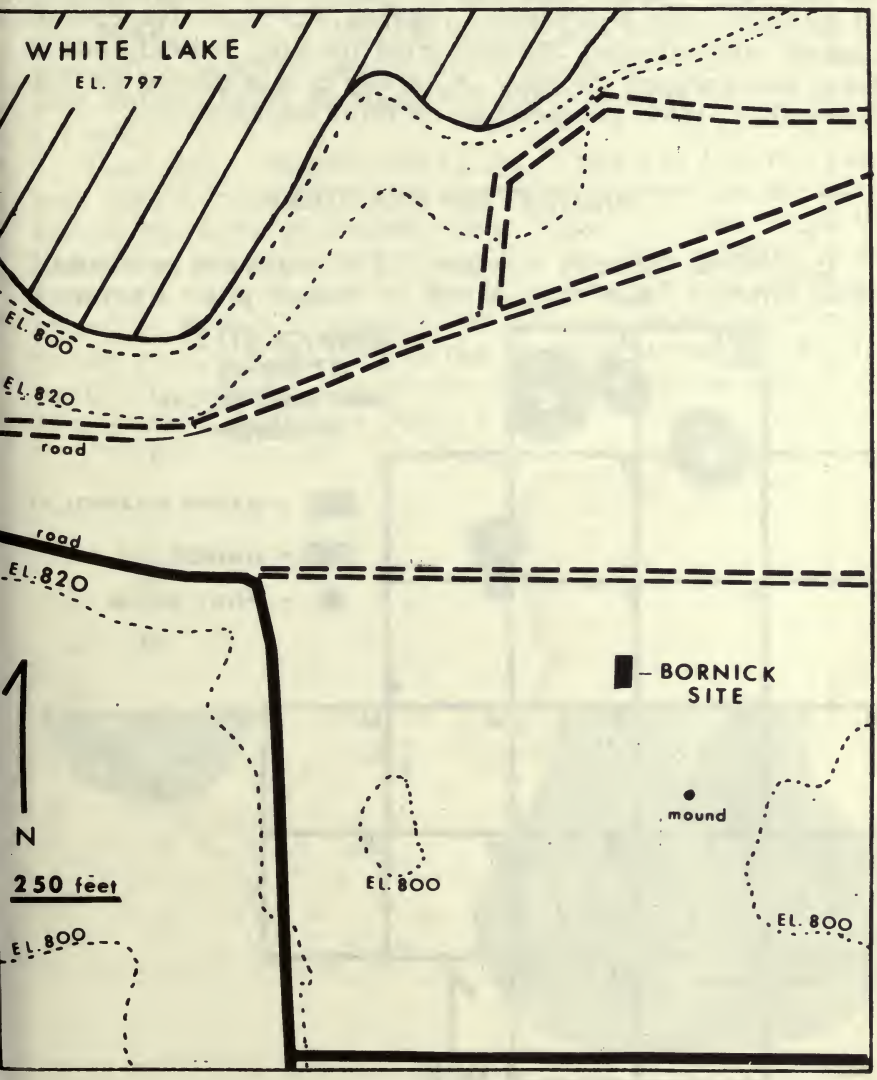
The Bornick site (47MQ65) is a previously unexcavated camp site approximately one acre in extent in the N.E. 1/4 of the S.W. 1/4 of the S.E. 1/4 of Section 1, Montello Township, Marquette County, Wisconsin. This small site is on the north-eastern fringe of the Grand River Marsh (Map 1), eight and one-half miles from the large, stockaded Grand River phase Walker-Hooper site. It was discovered



Map. 1. Location of the Bornick Site in Relation to Marshland in Monte Township, Marquette County (after Cook 1851).

and reported to the writer by Mr. Raymond Flaherty of Montello and named after the present owner, Mr. Emil Bornick.

Mr. Ina Cook, who surveyed Montello Township in December, 1851, described Section 1 as gently rolling and typified by second rate soils covered with white, bur, and black oak (Cook 1851). The site itself is two-fifths of a



Map 2. Location and Topographic Setting of the Bornick Site.

mile south of White Lake in a flat field disrupted in areas by natural pits or "kettles" (Map 2). A spring in a shallow ravine thirty yards east of the site may have served as a source of water. The soil is a slightly acid, excessively drained, brownisn loamy sand of the Oshtemo-Gotham complex. All midden samples recorded a pH of 8.0.

The site area has been plowed for many years and no surface features remain visible except for a thin scattering of potsherds and food debris. A series of at least five conical mounds are situated 300 feet from the site, but only one of them has escaped the plow. A survey of this plowed field in September, 1967, produced no cultural material.

HABITATION FEATURES

Habitation features consist of five scattered postmolds, sheet midden, and five cache or refuse pits. A brown B

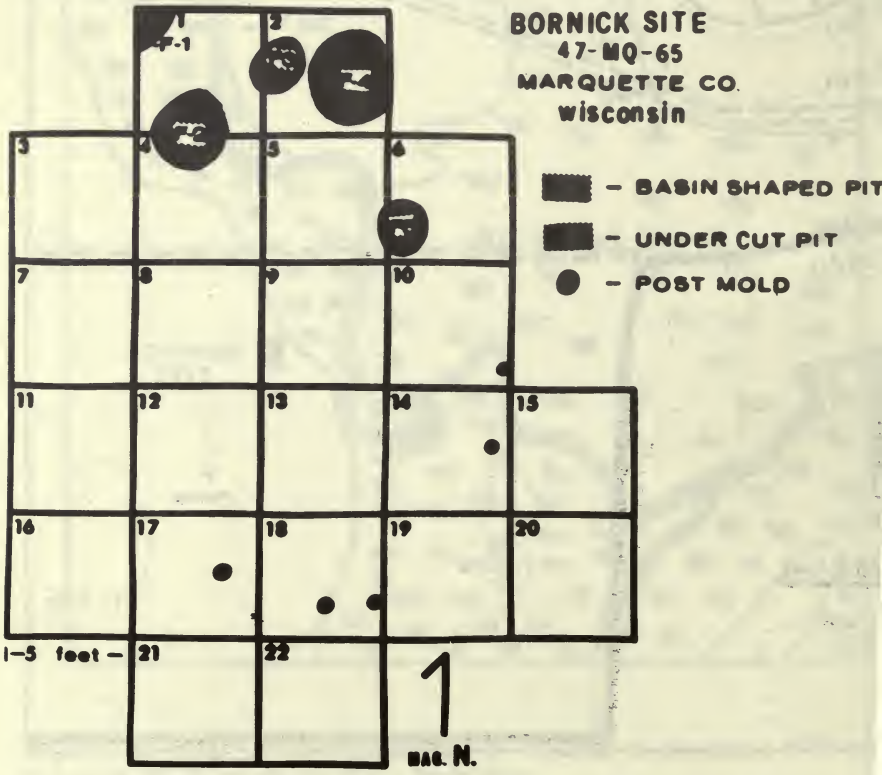


Figure 1. Excavated Area of the Bornick Site.

horizon obscured the definition of both postmolds and pits until the lighter C horizon was reached. Postmold stains were 0.5-0.6 feet in diameter and 0.5 to 1.0 feet in depth after discovery one foot below the plow zone (Figure 1). The sheet midden was represented by irregular splotches of light gray clayish soil rich in refuse materials. A large number of aquatic snails were present in the midden, suggesting that a combination of decaying organic material and clay brought from a near-by source was responsible for its texture. A similar pattern was found at the Walker-Hooper site (Gibbon 1969). Remnants of sheet midden were found in all units.

Four basin-shaped pits (1, 2, 3, and 5 in Figure 1) and one undercut pit (4) were clustered together in the north end of the area excavated. Clay "caps" or zones were not associated with any of the pits. The vertical profiles of the undercut pit and one of the basin-shaped pits are illustrated in Figure 2. The tops of all features were truncated by the plow, but the neck of the undercut pit seemed to rise vertically without a pronounced flare. Dimensions of the five pits are entered in Table 1.

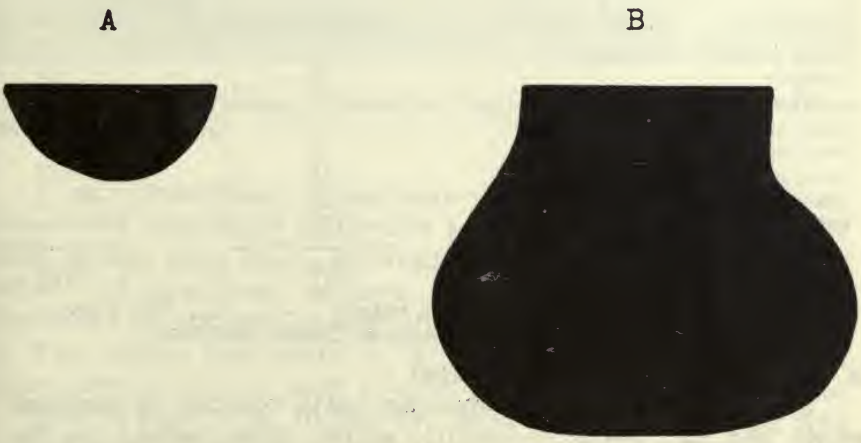


Figure 2. Pit Profile Examples from the Bornick Site (A Basin-shaped, Feature 5; B Undercut, Feature 4).

Table 1. Dimensions of Pits from the Bornick Site

pit	depth encountered below plow zone	diameters in feet orifice	neck	body	depth from orifice to base in feet
1	0.4'	1.7-1.5	-	-	1.1
2	0.5'	3.0	-	-	2.4
3	0.3'	2.0	-	-	1.4
4	0.2'	3.3	3.1	4.8	4.0
5	0.6'	2.4	-	-	1.4

ARTIFACTUAL ASSEMBLAGE

The chipped stone debitage represents a non-blade flake industry with bipolar and non-bipolar flaking techniques. A small number of artifacts of chipped stone (25), ground stone (20), metal (9), bone (7), and shell (8) were shaped into tools or ornaments. The frequency and percent of classes of stone debitage are listed in Table 2. Potsherds from globular shell tempered jars were the most common item recovered from the Bornick site (6587 sherds). Other objects of clay include five artifacts, eleven miniature vessels, and a small amount of clay waste. No grit tempered or Woodland sherds were found.

Table 2. Frequency and Percent of Classes of Chipped Stone Debitage

category	frequency	percent
decortication flakes	21	3.1
shatter	38	5.6
bipolar flakes	11	1.6
bipolar cores	6	0.9
non-bipolar cores	3	0.4
utilized flakes	44	6.5
other unused flakes	555	81.9
(chips)	(32)	
total	678	100.0

total weight * ..... 858.2 gms.
(* decortication flakes excluded)

A. Tools for Food Procurement

1. HUNTING TOOLS. Hunting tools consist of nineteen stone and two antler projectile points. Stone points are the most numerous formal category of chipped stone artifact at the site and occur in two basic forms.

Plate 1. Unnotched Triangular Projectile Points (A), Notched Projectile Point (B), and End Scrapers.

a) Unnotched Triangular Points (Plate 1). Fifteen unnotched triangular projectile points were found in situ and four in the plow zone. Provenience, maximum dimensions, extent of marginal retouch, configuration of edges and presence or absence of serrated sides are tabulated in Table 3. Ten points are chert (1, 2, 7-13, and 19 in Table 3) and nine quartzite (3-6, and 14-18). Most of the broken points consist of tips (7, 8, 10 and 19). Nine are isosceles and five are skewed or scalene.

b) Notched Point (Plate 1). A single corner-removed

expanded-stem point was discovered in the midden in level 1 of unit 7. Attributes of this points are: haft width-15 mm., basal width-18 mm., shoulder width-25 mm., total length-49 mm., haft length-13 mm., thickness-9 mm., and weight-10 gms. A similar specimen was found in an apparent Middle Woodland context at the Silver Creek II site (Hurley 1966:218).

Plate 2. Bone and Antler Artifacts from the Bornick Site.

Two antler projectile points have hollow cores and smooth carved surfaces with ridges around their centers (Plate 2, b). Their proveniences and lengths are: Feature 3, level 2, 22 mm.; unit 17, level 1, 35 mm.

Table 3. Attributes of Unnotched Triangular Projectile Points

#	unit/feature	level	weight in gms.	dimensions in mm.			retouch		configuration			
				length	width	thickness	on sides	on base	a - straight b - convex		strik. plat.	serrated sides
									sides	base		
1	F3	2	0.8	16	15	3	2	0	a	a	0	0
2	F3	3	0.6	13	12	4	2	X	a	a	X	0
3	F3	3	0.5	14	12	3	2	X	b	a	0	X
4	F3	3	-	17	(11)	2	2	0	a	a	X	0
5	7	1	-	(18)	16	5	2	X	a	a	0	X
6	10	1	0.6	14	12	3	2	0	b	a	0	X
7	10	1	-	(20)	-	4	2	-	a	-	-	0
8	13	1	-	(17)	-	4	2	-	a	-	-	0
9	14	1	0.7	17	12	4	2	0	a	a	X	X
10	14	1	-	-	-	2	2	-	a	-	-	X
11	17	1	-	(20)	-	5	2	-	b	-	-	X
12	18	1	1.4	24	16	3	2	0	b	a	0	X
13	18	1	0.6	18	15	2	2	X	a	a	0	0
14	19	1	0.9	20	13	4	2	0	b	b	0	0
15	19	1	0.5	14	10	2	2	X	a	a	X	0
16	Sf		1.8	36	14	4	2	X	a	a	0	X
17	Sf		1.1	23	13	4	2	X	b	a	0	0
18	Sf		-	17	14	5	2	0	a	b	0	0
19	Sf		-	-	-	3	2	-	a	-	-	X

0 = attribute not present; X = attribute present; - = absent data;
() = approximate value

2. FISHING IMPLEMENTS. Fishing implements consist of six small shell lures (Plate 5, a) and one flat ground stone net sinker (Plate 4, E). Two lures came from the plow zone and four from undisturbed deposits: Feature 3, level 3; unit 19, level 1 (three lures). The net sinker found in the plow zone has two opposing notches on the sides and maximum dimensions of 95 x 83 x 17 mm. There are no other signs of intentional modification.

Plate 5. Shell Artifacts from the Bornick Site.

Plate 4.

- **A. Sandstone Abrader (Feature 4)**
- **B. Iron Acretions (Feature 4; surface)**
- **C. Grinding Stone (Feature 4)**
- **D. Paint Stone (?) (unit 14, level 1)**
- **E. Net Sinker (surface)**
- **F. Grinding Stone (unit 4, level 1)**
- **G. Paint Stone (?) (surface)**

B. Fabricating and Processing Tools

1. STONE PROCESSING TOOLS AND DEBITAGE. Low quality chert of light to dark gray was the most common stone material in the chipped stone assemblage. Quartzite was the second most common stone, approximately fifteen percent, while quartz and other stone occurred in amounts less than one percent of the total chipped stone. Table 2 contains the frequency and percent of classes of chipped stone debitage. The distribution and frequency of shatter, decortication flakes, and the weight of debitage by excavation unit are listed in Table 32. Shatter consists of angular and cubical chunks of chert lacking bulbs of percussion and signs of deliberate modification. It is apparently a product of the initial percussion used to shape raw material (Binford and Quimby 1963:286-287). Decortication flakes are unworked flakes having unmodified cortex covering one face. Only 0.15% of the stone debitage consists of individual pieces weighing 10 gms. or more. The largest fragments are two cortex chunks weighing 136 gms. (Feature 4) and 134 gms. (level 2 of unit 19). All other chunks weigh between 10 and 17 gms. Small secondary remnants appear in the form of cortex on about eleven percent of the debitage.

a) HAMMERSTONES. Six irregular stones have signs of battering and hammering on their surface. Table 4 contains their provenience, weight, and maximum dimensions.

b) ANTLER FLAKER. A detached deer tine with a cut base was found in Feature 3, level 3.

c) BIPOLAR CORES AND FLAKES (Plate 3, F). Six cores are tentatively identified as representative of the bipolar technique. Three are polyhedral in shape (Feature 3, level 2; unit 4, level 2; unit 6, level 1) and three are flat (unit 11, level 1; unit 14, level 1; unit 19, level 1). The maximum length of these cores in order are 32 mm., 24 mm., 18 mm., 23 mm., 25 mm., and 17 mm. Table 32 contains the distribution of eleven bipolar flakes. The range in length of the bipolar flakes is 16 to 38 mm., with a mean length of 25.7 mm.

d) NON-BIPOLAR CORES. Three small wasted cores of gray-white chert were found at the site. The provenience a ' attributes of these cores are: Feature 3, level 3 (24 x 18 x 12 mm., 0.06 kgms.), unit 10, level 1 (24 x 22 x 18 mm., 0.05 kgms.), plow zone (28 x 22 x 18 mm.,

Plate 3. A-E: Side and End Retouched Flakes; F: Bipolar Flakes; G: Chipped Stone Knives; H: Perforator; I: Notched Flake; J: Copper Beads.

Table 4. Provenience and Attributes of Hammerstones

#	unit/ feature	level	weight in gms.	maximum dimensions in mm. length	width	thickness
1	F4	-	242	67	54	52
2	F5	2	427	77	75	59
3	2	1	54	42	37	30
4	10	1	41	41	33	26
5	13	1	202	66	55	40
6	14	1	275	67	62	39

0.09 kgms.). The size of some cortex chunks indicates that relatively large cores may have been initially shaped.

e) UNUSED FLAKES AND CHIPS. All remaining unused flakes with the exception of chips have been separated on the basis of material composition and placement of striking platform and/or bulb of percussion if present. These flakes range in weight from 0.5 to 17.0 gms., but with the exception of only a few pieces weight less than 10 gms. The distribution of these subcategories is recorded in Table 32.

(1.) unworked chert (total: 350)
  (a) end struck total: 97
  (b) side struck total: 27
  (c) absent total: 226
(2.) unworked quartzite (total: 203)
  (a) end struck total: 51
  (b) side struck total: 32
  (c) absent total: 120
(3.) unworked quartz (total: 2)
  (a) absent total: 2
(distribution: unit 17, level 1; unit 19, level 1)

The frequency and distribution of chips is probably a function of the amount of flotation undertaken for any particular unit. The distribution of chips by material composition and placement of striking platform and/or bulb of percussion if present is tabulated in Table 32.

(1.) chert chips	(total: 29)
(a) end struck	total: 5
(b) side struck	total: 2
(c) absent	total: 22
(2.) quartzite chips	(total: 3)
(a) end struck	total: 1 (unit 13, level 1)
(b) side struck	total: 1 (unit 18, level 1)
(c) absent	total: 1 (unit 11, level 1)

2. WOOD-BONE WORKING TOOLS: Wood-bone working tools consist of two notched flakes, a beaver incisor chisel, and a sandstone abrader.

a) NOTCHED FLAKES (Plate 3, I). One notched flake came from level 1 of unit 22 and has maximum dimensions of 19 x 8 x 3 mm. The notch is 2 mm. in depth and 5 mm. in length. An end-struck flake found in the plow zone has a notch on each side and maximum dimensions of 25 x 15 x 2 mm. Like the first flake the notches are unifacially retouched, although each notch is retouched from a different face.

b) SPLIT BEAVER TOOTH INCISOR (Plate 2, c). This incisor was found in level 1 of unit 10 and has considerable wear on both ends.

c) SANDSTONE ABRADER (Plate 4, A). A single abrader 77 x 43 x 28 mm. in maximum dimensions came from Feature 4. This irregular stone has a single groove 3 mm. in width on each of its two parallel flat surfaces.

3. DRILLING-PERFORATING TOOLS: Three bone awls, a bone punch, three flake drills, and a chipped stone perforator comprise this tool category.

a) DEER ULNA AWLS (Plate 2, a). The broken tip of a right ulna came from Feature 2. A left ulna 96 mm. in length came from level 1 of unit 2.

b) FLAT SPLINTER AWL (Plate 2, d right). A single flat splinter awl from the plow zone is 53 mm. in length.

c) BONE PUNCH OR NEEDLE (Plate 2, d left). A broken bone punch or needle was recovered from the plow zone.

d) FLAKE DRILLS. Three flakes exhibit continuous unifacial wear or secondary retouch along the margins of a

thin natural point. These flakes range in length from 15-21 mm. All lack striking platforms or bulbs of percussion. Their distribution is: Feature 3, level 3; unit 1, level 1; unit 17, level 1.

e) CHIPPED STONE PERFORATOR (Plate 3, H). A single crude perforator on an irregular flake lacking a striking platform or bulb of percussion was found on the surface. The maximum dimensions of this implement are 27 x 17 x 7 mm. Length of drill point is 6 mm. and width of point base is 9 mm.

4. MAT-FABRIC MAKING TOOLS: A single, broken, shell tempered POTTERY DISC from level 2 of Feature 3 was too small to discern the presence of a central perforation or its diameter.

5. POTTERY MANUFACTURING WASTE: Single lumps of fired clay of various sizes and shapes were found in level 2 of unit 19 and in level 1 of units 7-9, 13, 15, 16, and 22. Two lumps came from the first level of units 10 and 18. In addition to the twelve pieces of ceramic waste recovered in situ, four were picked from the plow zone. All of these pieces were quite small and may be untempered waste from the manufacture of clay artifacts, such as pots.

6. GENERAL CUTTING AND SCRAPING TOOLS: General cutting and scraping tools at the Bornick site consist of two knife fragments, two scrapers, and unifacially and bifacially modified flakes.

a) BIFACIAL KNIVES (Plate 3, G). A small chert knife base came from level 1 of unit 17 and has a maximum basal width of 17 mm. A white quartzite knife base with a maximum basal width of 24 mm. came from the plow zone. Both knives have beveled working edges and carefully flaked faces.

b) SCRAPERS (Plate 1, C). Two scrapers, an end and a side scraper, were found in situ. The end scraper is of chert, has maximum dimensions of 43 x 22 x 14 mm., and came from level 3 of Feature 3. Secondary retouching extends 10 mm. down the right side; the working length measures 4 mm. and the dorsal surface is highly irregular. There is no striking platform or bulb of percussion. The side scraper is of yellow quartzite and came from level 1 of unit 17. Length of the working edge is 19

mm. and maximum dimensions are 20 x 16 x 5 mm. There is no lateral retouch on the flake, which is side-struck.

c) SIDE AND END RETOUCHED FLAKES (Plate 3, A-E). The remainder of the worked and utilized flakes have been divided into a number of categories depending on location and position of wear and striking platform and/or bulb of percussion. Of these forty flakes twenty-three are unifacially retouched and seventeen bifacially retouched. The flakes range in length from 10-52 mm. A standardized size or form seems to be lacking. The distribution of these flakes are listed in Table 33.

(1.) side retouched (total: 24)
unifacial retouch along one edge parallel to long axis of flake
(a) end struck total: 4
(b) side struck total: 1
(c) absent total: 5

unifacial retouch along both edges parallel to long axis of flake
(a) absent total: 1

bifacial retouch along both edges parallel to long axis of flake
(a) absent total: 2

bifacial retouch along one edge parallel to long axis of flake
(a) end struck total: 3
(b) side struck total: 1
(c) absent total: 7

(2.) end retouched (total: 13)
unifacial retouch along one end perpendicular to long axis of flake
(a) side struck total: 1
(b) absent total: 8

unifacial retouch along both ends perpendicular to long axis of flake
(a) side struck total: 1
(b) absent total: 1

bifacial retouch along one end perpendicular to long axis of flake
(a) absent total: 2

(3.) end and side retouched (total: 3)
unifacial retouch along one end and side of flake
(a) absent total: 1

bifacial retouch along one end and side of flake
(a) absent total: 2

7. GENERAL FOOD PROCESSING IMPLEMENTS: Implements in this category consist of seven grinding stones, two shell spoons, a clay spoon, and a possible metate.

a) GRINDING STONES (Plate 4, C and F). Seven ground stone artifacts with a single flat surface apparently the result of abrasion are classified as grinding stones. The provenience, weight, maximum dimensions, and number of these artifacts are recorded in Table 5. All of these implements are irregular in shape and size. A surface find not included in the table may represent a fragment of a large metate.

Table 5. Provenience and Maximum Dimensions of Grinding Stones

#	unit/ feature	level	weight in gms.	maximum dimensions in mm. length	width	thickness
1	F3	3	14	32	29	13
2	F3	3	23	32	30	21
3	F4	-	28	26	24	16
4	F5	2	140	56	45	42
5	4	1	561	99	87	59
6	11	1	163	64	51	29
7	19	2	74	(55)	40	26

b) SHELL SPOONS (Plate 5, c). The tang and part of the body of a shell spoon made from a right valve was found in the plow zone. This spoon is of the IIa type in J.W. Griffin's classification (1946:35). The lateral edge of a second spoon came from level 3 of Feature 3. Notching along the lateral edge suggests that it may be part of a type IIb spoon.

c) CLAY SPOON OR LADLE (Plate 8, G). A small, broken, shell tempered implement may represent a spoon

or ladle. The implement came from level 1 of unit 10 and was apparently molded into shape by hand. It is slightly irregular in outline and has a tab on one end.

C. Recreational and Ornamental Artifacts

1. CLAY PIPES. Small fragments of three shell tempered pipes were found in the site debris. An elbow pipe, from level 3 of Feature 3, is peculiar in that both arms are welded together at the elbow. The diameter of the hole in the stem is 7-8 mm., narrowing to 6 mm. at the juncture of stem and bowl. Lip thickness is 5 mm. The bowl is too fragmentary to note more than that it is plain and bells outward. A swelling or crest beginning 5-6 mm. below the flat bowl lip is the only visible decoration.

A second pipe consists of two fragments of a bowl from level 3 of Feature 3 and Feature 4. Except for color, these fragments could represent pieces of the first pipe. The third pipe is represented by a sub-angular corner of a bowl found in the plow zone.

2. PAINT STONES (Plate 4, D and G). A stone found in level 1 of unit 14 has a reddish residue on one flat surface. The maximum dimensions of the stone are 66 x 44 x 21 mm. The surface of a stone from the plow zone has been worn down into a groove possibly through abrasion of a pigment, for a white and gray residue adheres to the surface. Maximum dimensions of this stone are 105 x 62 x 24 mm.

3. GALENA. Two galena cubes came from level 1 of unit 14.

4. COPPER BEADS AND FLAKES (Plate 3, J). Two tubular 'beads' and two waste flakes were found in undisturbed midden. A third waste flake was picked from the plow zone.

Table 6. Provenience and Maximum Dimensions of Copper

#	unit/ feature	level	maximum dimensions in mm. length	width	thickness	item
1	1'	1	22	14.5	5	float copper
2	2	1	14	6.0	0.5	flake
3	16	1	15	5.5	-	bead
4	18	1	11	6.0	-	bead
5	Sf		14	8.0	0.5	flake

D. Containers

A globular or ellipsoidal shell tempered pottery vessel

with a rounded base and shoulder area, constricted neck, and out-flaring rim was the only type of large container (with the exception of pits) found at the site. No complete or nearly complete vessels were recovered. A count of large rim sections suggests that there was a minimum of at least seventy-one of these jars. Fragments of eleven miniature shell tempered jars also came from the site. Ther ceramic analysis of large jars is based on the following sample:

location	undecorated bodysherds	decorated bodysherds	unattached rims	unattached lips	unattached vessels
in situ	3888	127	33	121	10
surface	2165	124	25	91	3
site total	6053	251	58	212	13

Most sherds have a moderate to abundant amount of shell temper, few pieces of which exceed 3 mm. in length. Every large sherd examined also contained sperical iron oxide particles ranging in size from minute to 3 mm. in diameter. The surfaces of all sherds are dull and smooth. Nearly all vessels exhibit scraping or smoothing in the form of numerous parallel striations. The consistency of the sherds ranges from flaky to a more moderately compact structure. The thickest areas of the average vessel are the neck and base. Table 7 indicates the frequency in percent of body and shoulder sherd thickness. Vessel height and capacity could not be determined. The majority of vessels had the same interior and exterior colors. Table 8 contains a representative sample of vessel colors. Sherd cores are generally grayer than surface colors.

Table 7. Body and Shoulder Sherd Thickness

maximum thickness in mm.	percent
1.5 to 2.5	1.0
2.6 to 3.5	13.0
3.6 to 4.5	16.0
4.6 to 5.5	27.0
5.6 to 6.5	23.0
6.6 to 7.5	10.0
7.6 to 8.5	6.0
8.6 to 9.5	1.5
9.5 to 10.5	2.0
10.6 to 11.5	0.5

Table 8. Percentages of Surface Colors on Vessels

location	yellowish-brown	brown	reddish-brown	gray	black
exterior	25	39	14	5	17
interior	28	34	14	6	18

The terminology used to describe vessel form consists of lip, rim, neck, shoulder area, and body:

1. lip-juncture of the inner and outer surfaces of the vessel
2. rim-zone between the lip and the neck
3. neck-point of minimum constriction where rim and shoulder are joined
4. shoulder area-space between the neck and the point of maximum body diameter
5. body-area between the neck and the base of the vessel.

1. ATTRIBUTES OF LARGE JARS. Individual attribute classes and their elements are described below. Combinations of elements on vessels (rimsherds with a fairly large portion of the shoulder attached) and unattached rims and lips are recorded in Appendix A. Tables in the appendix also contain the weight of pottery and number of plain sherds by unit and level. A brief discussion of established types follows the discussion of attribute classes.

CLASS I: LIP PROFILE

Lip profiles from large jars from the Bornick site are of five different kinds (Figure 4, A). Table 9 below contains the frequency and percentage of these elements.

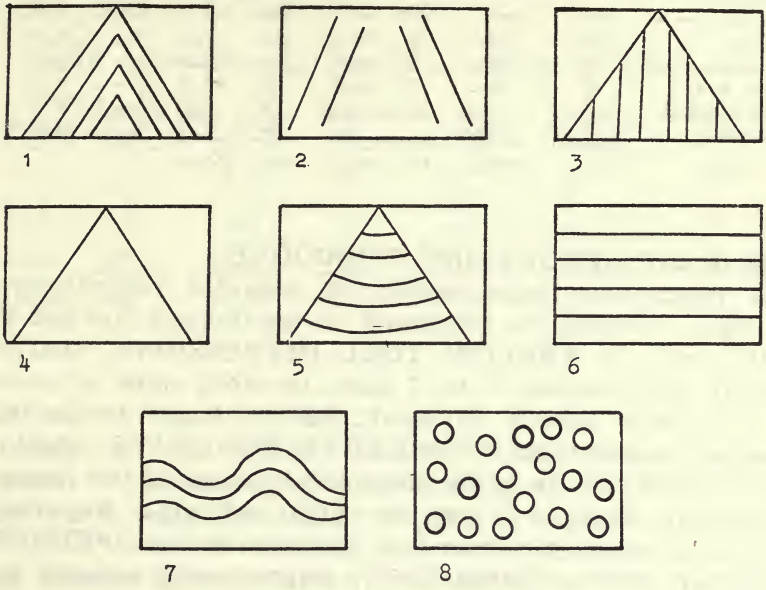
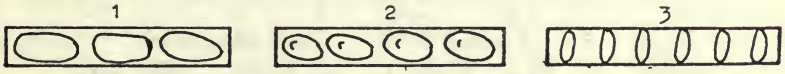


Figure 3. Class XVI Shoulder Design Elements

A. Class I Lip Profile Elements (interiors to left)



B. Class III Lip Design Elements

C. Classes VIII and X

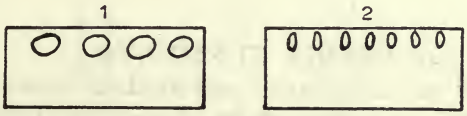


Figure 4. Lip and Rim Elements for Classes I, III, VIII, and X

Table 9. Lip Profile Elements

lip profile	lips and rims no.	%	vessels no.	%	site total no.	%	thickness (mm.) range	mean
1. rounded	136	50.4	9	69.2	145	51.0	3 - 7	4.7
2. flattened	79	29.2	2	15.4	81	29.0	3 - 8	5.6
3. inward bevel	27	10.0	2	15.4	29	10.0	4 - 8	5.4
4. outward bevel	4	1.5	0	0	4	1.5	4 - 5	4.5
5. thickened	24	8.9	0	0	24	8.5	5 -11	6.0
total	270	100.0	13	100.0	283	100.0		

CLASS II: LIP DECORATION TECHNIQUE

All fragments large enough to consider vessels have plain lips. Techniques employed on unattached rim and lip sherds are: 1) NARROW TOOL-IMPRESSIONS: shallow elliptical impressions 4 to 7 mm. in width made by pressing a narrow object downward at an angle to the still malleable lip surface; 2) FINGERTIP PUNCTATE: shallow ovoids 5 to 7 mm. in width produced by pushing the fingertip straight downward onto the still soft lip-a fingernail imprint can usually be found in the punctations; 3) FINGER OR BROAD TOOL-IMPRESSION: impressions usually between 10-14 mm. in width made by pushing the finger or a broad tool down onto the lip.

The following table lists the frequency and percent of these elements.

Table 10. Lip Decoration Techniques

technique	unattached rims no.	%	unattached lips no.	%	vessels no.	%	site total no.	%
1	0	0	1	0.45	0	0	1	0.3
2	2	3.5	1	0.45	0	0	3	1.1
3	0	0	3	1.40	0	0	3	1.1
plain	56	96.5	207	97.7	13	100	276	97.5
total	58	100	212	100	13	100	283	100

CLASS III: LIP DESIGN ELEMENTS

Designs on decorated unattached rims and lips are of three kinds: 1) consecutive finger or broad tool-impressions 3 to 20 mm. apart; 2) consecutive fingertip punctates 2 to 30 mm. apart; 3) consecutive transverse, narrow tool-impressions 3 to 8 mm. apart. These elements are illustrated in Figure 4, B. The provenience of sherds with

lip design is recorded in Table 30. Table 11 lists the percent and frequency of Class III elements.

Table 11. Frequency and Percent of Lip Design Elements

design	unattached lips		unattached rims		vessels		site total	
	no.	%	no.	%	no.	%	no.	%
1	3	1.4	0	0	0	0	3	1.1
2	1	0.5	2	3.4	0	0	3	1.1
3	1	0.5	0	0	0	0	1	0.3
plain	207	97.6	56	96.6	13	100	276	97.5
total	212	99.9	58	100.0	13	100	283	100.0

CLASS IV: RIM PROFILE

Rims of unattached rimsherds and vessels were assigned to seven basic profiles (Figure 5). Profiles 1, 2, and 6 are characterized by a straight to gently curving rim 5° to 45° from a vertical line drawn through the neck and are differentiated by arbitrary rim height limits (1 - greater than 35 mm., 2 - between 20 and 35 mm., 6 - less than 20 mm.). A study of standard deviation and other measures of dispersion may suggest less arbitrary breaks than these. Curved (Figure 5, left in 1) and fairly straight rims (Figure 5, center and right in 1) in these three categories are designated by a and b respectively. Table 12 records the frequency and percent of basic profiles.

Table 12. Frequency and Percent of Basic Rim Profiles

profile	unattached rims		vessels		site total	
	no.	%	no.	%	no.	%
1	10	17.8	3	23.1	13	18.8
2	22	39.3	4	30.8	26	37.7
3	4	7.1	3	23.1	7	10.1
4	1	1.8	0	0	1	1.4
5	2	3.6	1	7.7	3	4.4
6	16	28.6	2	15.4	18	26.1
7	1	1.8	0	0	1	1.4
total	56	100.0	13	100.1	69	99.9

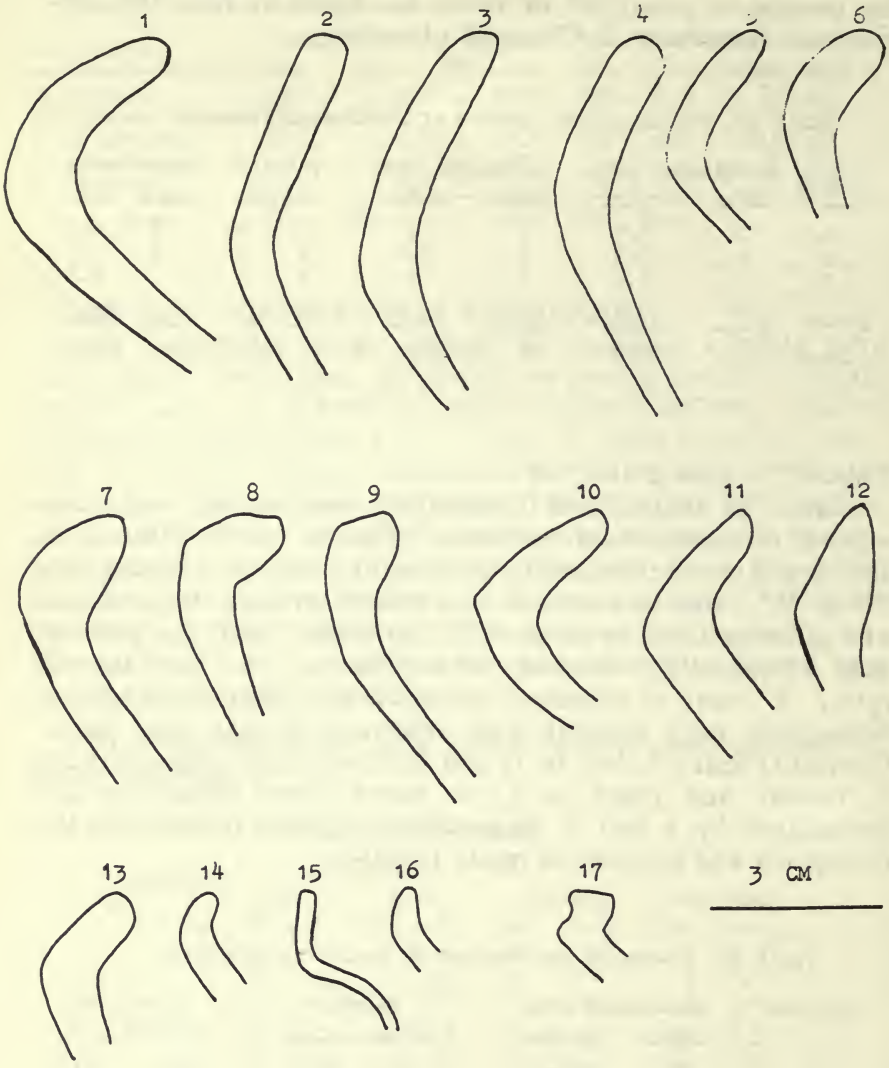


Figure 5. Class IV Rim Profiles
(1-3 profile 1; 4-6 profile 2; 7-9 profile 3; 10 profile 4; 11-12 profile 5; 13-16 profile 6; 17 profile 7)

CLASS V: RIM CROSS SECTION

Rim cross sections displayed a rim either of even thickness (1), thinning to the lip (2), or expanding to the lip (3).

Table 13. Frequency and Percent of Rim Cross Sections

cross section	unattached rims		vessels		site total	
	no.	%	no.	%	no.	%
1. even thickness	17	34.7	2	15.4	19	30.6
2. thinning to lip	28	57.1	11	84.6	39	62.9
3. expanding to lip	4	8.2	0	0	4	6.5
total	49	100.0	13	100.0	62	100.0

CLASS VI: RIM HEIGHT

The height of rims from the Bornick site ranges from 8 to 51 mm. with a mean of 24 mm. Table 14 lists the frequency and percent of rim heights by arbitrary categories. Individual rim heights are tabulated in Tables 27 and 30. Measurements of dispersion for rim height and for lip, rim, and neck thickness are listed in Table 31.

Table 14. Frequency and Percent of Rim Heights

height in mm.	unattached rims		vessels		site total	
	no.	%	no.	%	no.	%
1 to 9	1	1.8	1	7.7	2	2.9
10 to 19	20	35.7	3	23.1	23	33.3
20 to 29	22	39.3	6	46.1	28	40.6
30 to 39	9	16.1	2	15.4	11	15.9
40 to 49	3	5.3	1	7.7	4	5.8
50 to 59	1	1.8	0	0	1	1.5
total	56	100.0	13	100.0	69	100.0

CLASS VII AND VIII: INNER RIM DESIGN TECHNIQUE AND ELEMENTS

Two unattached rims and two lip fragments are decorated on the upper edge of the inner rim with continuous (Class VIII, element 1) finger or broad tool-impressions (Class VII, element 1). Impressions are 14 to 20 mm. in maximum diameter and are ovoid in outline. The basic decorative design is a single row of impressions 5 to 15 mm. apart circling the upper edge of the inner rim (Figure 4, C). The provenience of these sherds is recorded in Table 30.

CLASS IX AND X: LIP EXTERIOR DESIGN TECHNIQUE ND ELEMENTS

The lip exterior of three rim sherds and four lip fragments are decorated. The rim sherds and three of the lip

fragments are decorated with continuous (Class X, element 1) finger or broad tool-impressions (Class IX, element 1). Decoration on the fourth lip fragment consists of a band of continuous, vertical (Class X, element 2) elliptical tool-impressions (Class IX, element 2) (Figure 4, C). Elliptical tool-impressions are 4 to 7 mm. in width. Other measurements conform to those given in Classes VII and VIII. The provenience of sherds with lip exterior modification is listed in Table 30.

CLASS XI: ANGLE OF RIM TO BODY

The angle of the rim to the body on all vessels that could be measured is outslanting (element 1), with an angular divergence of 5° to 45° .

CLASS XII: SHOULDER-NECK CONFIGURATION

The juncture of the rim and neck on all sherds large enough to consider representative of a vessel was curved (element 1). Necks on one unattached rimsherd (unit 14, level 1) and two plain shoulder sherds (level 1 in units 5 and 18) are angular (element 2). One hundred and sixteen other sherds have curved necks. The small percent of angular necks (2.3%) is comparable to the Walker-Hooper site sample (1.9%). Table 29 contains the frequency and provenience of sherds consisting only of curved neck fragments.

CLASS XIII: SHOULDER DECORATION TECHNIQUE

Seven decoration techniques were used on shoulder sherds found at the Bornick site. None of the shoulders of the thirteen vessels were decorated. Only 4% of all body-sherds are decorated. The decoration techniques used are: 1) TRAILED TOOL - a narrow blunt-ended tool pulled across a still malleable shoulder surface; 2) TRAILED TOOL AND BLUNT PUNCTATE - trailing combined with punctates 2 to 4 mm. in diameter made by pushing a blunt ended tool straight down into the soft clay; 3) REED PUNCTATE - small round punctates usually 2 to 3 mm. in diameter and 1 to 5 mm. in depth made with a hollow tube, presumably a reed or bone; 4) TOOL-IMPRESSED - an impression formed by placing a blunt-ended object on the soft vessel surface and pressing downward at an angle to the surface; 5) REED TRAILED - a variant of 1 with numerous striations within the trailed line; 6) 'HALF-MOON' PUNCTATE - punctates formed by a solid, blunt-ended, crescent 2 to 4 mm. in maximum width; 7) FINGER-

TIP PUNCTATE. Some of these techniques are illustrated in Plates 6 and 7. The provenience of decorated bodysherds and their associated attributes are recorded in Table 29.

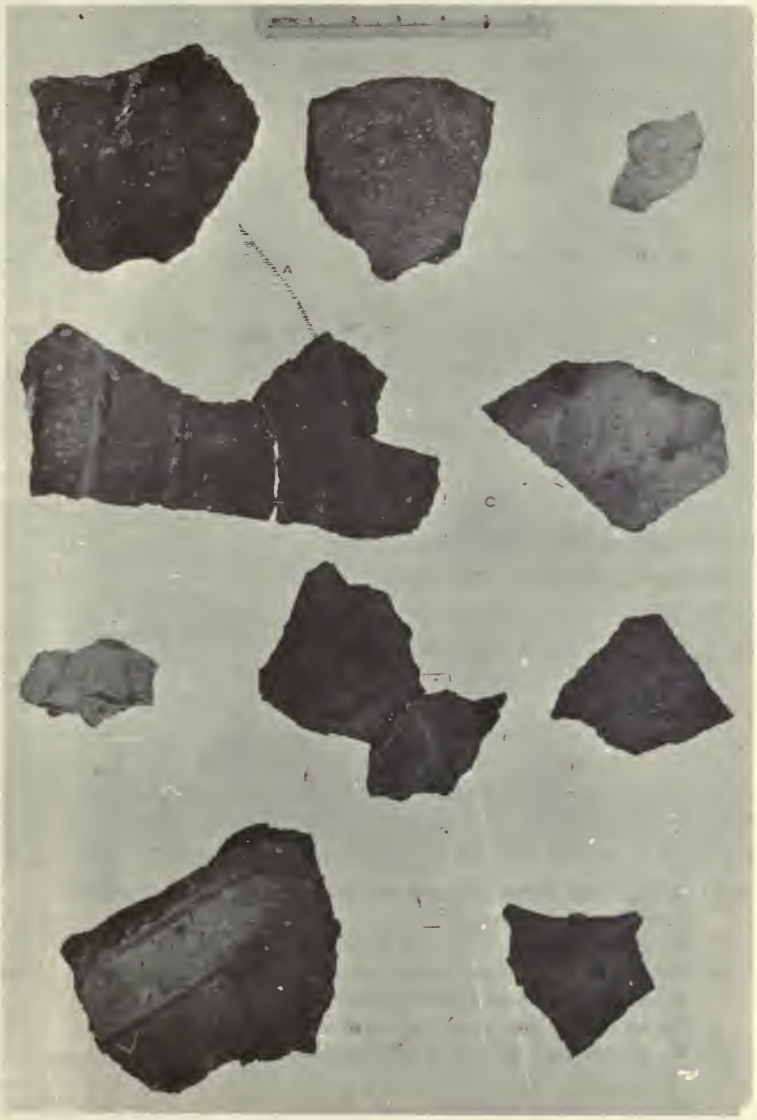


Plate 6. Class XVI Shoulder Design Elements

A. element 1
B. element 2
C. element 3
D. element 4
E. element 5
F. element 6
G. element 7
H. element 8

Plate 7. Sherd Design Elements and Miscellaneous Ceramics.

Sherd Design Elements

A. design 6 : two or more curvilinear trailed lines
B. design 9 : two or more tool-impressions
C. design 9 : two or more punctations, blunt-ended
D. design 3 : two intersecting trailed lines
E. unique surface sherd with two chevrons

Miscellaneous Ceramics

F. pottery lug (unit 18, level 1)
G. pottery ladle (?) (unit 10, level 1)
H-L. miniature vessel fragments (H. surface; I. unit 4, level 1; J. unit 1, level 1; K. unit 9, level 1; L. surface)
M. ceramic waste

Table 15. Frequency and Percent of Shoulder Decoration Techniques

shoulder decoration	shoulder sherd fragments no.	%
1. trailed tool	214	84.6
2. trailed tool and blunt punctate	2	0.8
3. reed punctate	1	0.4
4. tool-impressed	4	1.6
5. reed trailed	29	11.5
6. 'half-moon' punctate	1	0.4
7. fingertip punctate	2	0.8
(plain sherds: in situ ... 3883) : surface ... 2164)		
total	253	100.1

CLASS XIV: WIDTH OF TRAILED LINES

The width of trailed lines decorating the exterior surfaces of shoulder sherds in Class XIII was measured and arbitrarily assigned to one of three categories.

Table 16. Frequency and Percent of Categories of Trailed Line Widths

width category	shoulder sherd fragments no.	%
1. fine .1 to 2.5 mm.	35	14.4
2. medium 2.6 to 4.5 mm.	126	51.9
3. wide 4.6 to 8.0 mm.	82	33.7
total	243	100.0

CLASS XV: SHOULDER DESIGN

Decorated bodysherds were separated into categories on the basis of the kinds of designs displayed. Table 17 records the frequency and percent of these categories.

Table 17. Frequency and Percent of Shoulder Designs

shoulder design	shoulder sherd fragments no.	%
1. rectilinear	220	87.6
2. curvilinear	17	6.8
3. both 1 and 2	4	1.6
4. tool-impressions or punctations	8	3.2
5. both 1 and 4	2	0.8
total	251	100.0

CLASS XI: SHOULDER DESIGN ELEMENTS

Decorated shoulder sherds large enough to display a

complete or nearly complete shoulder element exhibited seven different elements. These elements are illustrated in Figure 3 and in Plate 6 (A-G). Sherds too small to exhibit an element were separated into nine sherd design element categories. Table 18 lists the frequency and percent of both shoulder and sherd design elements. The sherd design elements are:

1. single straight line
2. two or more parallel straight trailed lines
3. two or more intersecting trailed lines in a chevron pattern (Plate 7, D and E)
4. criss-crossing trailed lines
5. single curvilinear trailed line
6. two or more curvilinear trailed lines (Plate 7, A)
7. one straight and one curvilinear line
8. trailed line with bordering punctates or tool-impressions
9. two or more punctates or tool-impressions (Plate 7, B and C).

Table 18. Frequency and Percent of Shoulder Design Elements and Fragmented Sherd Design Elements

shoulder design elements	bodysherds		fragmented sherd design elements	bodysherds	
	no.	%		no.	%
1	15	55.6	1	168	75.7
2	3	11.1	2	5	2.2
3	4	14.8	3	17	7.7
4	1	3.7	4	6	2.7
5	2	7.4	5	9	4.0
6	1	3.7	6	5	2.2
7	1	3.7	7	2	0.9
			8	2	0.9
			9	8	3.6
	27	100.0		222	99.9

CLASS XVII: LOCATION OF DECORATION

None of the thirteen sherds large enough to consider representative of whole vessels are decorated. The remaining sherds are too small to determine combinations of decoration on the lip, rim, and shoulder. However, the scarcity of decorated lips, rims, and shoulders suggests that vessels from the Bornick site are best typified by the absence of decoration.

CLASS XVIII: APPENDAGES

No loop or strap handles were found at the Bornick site. A fragment of what appears to be a shell tempered, rectangular lug came from level 1 of unit 18 (Plate 7, F). This appendage was made by folding-over and shaping a flat strip of clay. Opposing holes in the upper shoulder area were apparently the primary means of suspension. The distribution of the seven sherds with holes drilled through from the exterior is recorded in Table 30.

2. Large Jar Pottery Types

The thirteen large, globular, shell tempered jars that are complete enough to treat as whole vessels can all be assigned to the type GRAND RIVER PLAIN (Hall 1962: 68-70). Table 27 contains the provenience of these vessels and their attribute combinations. The large number of plain lips and bodysherds indicates that most of the vessels in the sample were of this type. The predominanace of rectilinear shoulder designs and plain lips also suggests, that GRAND RIVER TRAILED vessels were the next most frequent type. A few vessels combining lip notching and curvilinear shoulder designs (Class XV, elements 2 and 3) or lip notching and plain shoulders may have been of the CARCAJOU CURVILINEAR and CARCAJOU PLAIN types. The actual presence of Carcajou types cannot be verified, because of the fragmented condition of the remaining vessels.

3. MINIATURE VESSELS (Plate 6, H; Plate 7, H-L)

Sherds representing eleven shell tempered miniature vessels are described in Table 28 in the appendix. Seven are unattached rim sherds, one is a shoulder sherd, and three are complete enough to consider vessels. Attributes are those described for large jars, except for shoulder design element 8 (Plate 6, H). No food residue was found within any of the vessels.

4. MISCELLANEOUS SHERDS

a) PAINTED SHERD (Plate 6, D). A shoulder sherd with a positive painted black chevron pattern came from the plow zone.

b) PROBLEMATIC SHERD (Plate 7, left in A). A sherd with a marked concavo-convex cross-section, probably representing a node on the shoulder of a small vessel, was found in the plow zone. The exterior of the sherd is decorated with at least two narrow trailed lines encircling the

lower half of the node.

E. Miscellaneous Artifacts

1. MISCELLANEOUS WORKED SHELL. Two pieces of scored shell (Feature 5, level 2; unit 5, level 1) are the only other shell artifacts from the site.

2. WORKED SLATE. Two small pieces of reddish slate from level 1 of unit 10 appear to be ground around the edges.

3. IRON CONCRETIONS (Plate 4, B). Two iron concretions may or may not be artifacts. Their provenience is Feature 4 and the plow zone. There are no signs of scratching or other indications of use.

THE ECONOMIC BASE

A. Plant and Animal Remains

Tables summarizing the range and quantity of particular classes of animal species are included at the end of this subsection. The distribution of some of these classes by provenience unit are tabulated in Table 23. The distribution of other species can be obtained through the Department of Zoology at the University of Wisconsin. The mammals, birds, and reptiles were identified by Elizabeth Pillaert. Counts of individuals were obtained by taking the highest number of any identifiable bone from either side of the animal's body. Dr. David A. Baerreis identified the fresh-water and terrestrial snails. The fish and fresh-water mussels were identified by the writer. Counts of individual mussels were obtained by taking the largest number of right or left valves. Lefts and rights of ten fish elements were identified for the large sample of fish. These elements were among the most easily identifiable and most prominent numerically of the fish bones (e.g. dentary, articular, premaxillary, maxillary, opercular). The largest number of any left or right of these ten elements was used to determine the minimum number of individuals. This method provides a farily reliable count of the minimum number of individuals. The actual number is undoubtedly higher.

The carbonized seed and nut remains were identified by Mr. Leonard Blake. Thirty-seven corn grains, forty-three hickory nuts, six acorns, and five hazelnuts were identified. Table 23 contains the distribution by provenience of corn grains and Hickory nut shells. Acorns were found

in: Feature 2; Feature 3, level 2; unit 2, level 1; unit 14, level 1; unit 18, level. Hazelnuts came from: Feature 3, level 3; Feature 4; unit 2, levels 1 and 2. Measurement of corn grains gave an estimated mean row number of 8.6 (of the nine grains measured six were estimated to be 8-row and three 10-row). A large amount of charcoal was also obtained and is presently stored at the University of Wisconsin in the Department of Anthropology.

B. Habitat Analysis

In order to reconstruct the exploitive pattern of prehistoric peoples it is necessary to attempt to reconstruct the composition of their natural surroundings. The method used to interpret the composition of the local flora and fauna during the period of site habitation is the 'scored habitat preference' method (e.g. Cleland 1966). All of the mammal, bird, and reptile species were given two points for primary habitat preference and a single point for secondary preferences. An indication of the composition of the natural habitat at the site can be obtained by adding the columns. The following table summarizes the percentages of the habitat preferences at the Bornick site.

Table 19. Habitat Preferences of Mammals, Birds, and Reptiles Expressed in Percent

aquatic	deciduous forest	forest-edge	grasslands
54	20	15	11

The percentages in Table 19 suggest the presence of extensive waterways and marshland, open deciduous forests, and some grasslands. This environmental setting is essentially identical to that of the early historic period..

C. Exploitive Pattern

The animal bones and their depositional context reflect a primary emphasis on the exploitation of aquatic resources. Minimum pounds of meat have been estimated for the total numbers of animals (Tables 20-22). Table 24 below contains the estimated minimum pounds of meat obtained from each class of animal and the percent of meat from animals by habitat preferences.

Table 20. Vertebrates Identified from the Bornick Site (Table prepared by Elizabeth Pillaert)

SPECIES	elements	%	minimum no. of individ.	%	estimated lbs. of meat	%
Mammals	385	87.10	23	53.49	1151	98.04
Blarina brevicauda [1] Short-tailed Shrew	1	0.23	1	2.33	-	-
Citellus tridecemlineatus Thirteen-lined Ground Squirrel	1	0.23	1	2.33	-	-
Castor canadensis Beaver	11	2.49	1	2.33	39	3.32
Peromyscus maniculatus [1] Prairie Deer Mouse	6	1.36	3	6.98	-	-
Ondatra zibethica Muskrat	12	2.71	3	6.98	6	0.51
Canis familiaris Domestic Dog	11	2.49	1	2.33	9	0.77
Canis sp. probably Domestic Dog	1	0.23	1	2.33	9	0.77
Procyon lotor Raccoon	10	2.26	2	4.65	18	1.53
Martes pennanti Fisher	1	0.23	1	2.33	7	0.60
Lutra canadensis River Otter	2	0.45	1	2.33	13	1.11
Cerus canadensis Elk	7	1.58	1	2.33	350	29.81
Odocoileus virginianus White-tailed Deer	322	72.85	7	16.28	700	59.63
Unidentified Bones	10044	- - - - - - - - - - - - - -				
Birds	38	8.60	14	32.56	18	1.53
Branta canadensis Canada Goose	2	0.45	1	2.33	6	0.53

([1] Not considered a food item)

Table 20 (cont.)

	elements	%	minimum no. of individ.	%	estimated lbs of meat	%
Anas platyrhynchos or A. rubripes Mallard or Black Duck	1	0.23	1	2.33	2	0.17
Anas dicors Blue-winged Teal	3	0.68	1	2.33	-	-
Spatula clypeata Shoveler	1	0.23	1	2.33	1	0.09
Aythya collaris or A. affinis Ring-necked Duck or Lesser Scaup	10	2.26	3	6.98	4	0.34
Erismatura jamaicensis Ruddy Duck	1	0.23	1	2.33	1	0.09
Anatidae Ducks	13	2.94	3	6.98	3	0.26
Pedioecetes phasianellus Sharp-tailed Grouse	3	0.68	1	2.33	1	0.09
Ectopistes migratorius Passenger Pigeon	1	0.23	1	2.33	-	-
Passeriforms [1] Songbirds	3	0.68	1	2.33	-	-
Unidentified Bones	255	- - - - - - - - - - - - - - -				
Reptiles	11	2.49	4	9.30	5	0.43
Chelydra serpentina Snapping Turtle	1	0.23	1	2.33	3	0.26
Emys blandingi Blanding's Turtle	2	0.45	1	2.33	1	0.09
Chrysemys picta Painted Turtle	6	1.36	1	2.33	1	0.09
Snake sp. [1]	2	0.45	1	2.33	-	-
Unidentified Bones	160	- - - - - - - - - - - - - - -				
Amphibians	8	1.81	2	4.65	-	-
Rana catesbiana Bullfrog	8	1.81	2	4.65	-	-
Unidentified Bones	29	- - - - - - - - - - - - - - -				
totals	442	100.02	43	100.10	1174	100.00

Table 21. Fish Identified from the Bornick Site

SPECIES	minimum no. of individ.	%	estimated lbs. of meat	%
	711	97.8	925.1	99.9
Ictalurus sp. Bullhead	143	17.9	71.5	7.7
Aplodinotis grunniens Fresh-water Drum	213	30.0	319.5	34.5
Micropteras sp. Bass	160	22.5	240.0	25.9
Centrarchidae sp. Crappie	80	11.2	20.0	2.2
Cottus bairdii Mottled Sculpin	20	2.8	10.0	1.1
Moxostoma sp. Redhorse	11	1.5	33.0	3.6
Esox lucius Northern Pike	14	2.0	98.0	10.6
Percidae sp. Perch	4	0.6	1.6	0.2
Salvelinus sp. Trout	11	1.5	55.0	5.9
Lepisosteus sp. Gar	14	2.0	56.0	6.0
Unidentified Species	41	5.8	20.5	2.2

Table 22. Fresh-water Mussel and Snail Remains from the Bornick Site

A. Fresh-water Mussels [1]	number
Actinonaias carinata	47
Amblema costata	2
Laemigona costata	11
Ligumia recta	21
Pleurobema coccineum	15
Strophitus rugosus	28
Unidentified species (Sphaeriidae = 7)	2
Hinges	201
minimum number of individuals	227
estimated lbs. of meat =	14

B. Fresh-water Snails [1]	number	(provenience)
Amnicola limosa (Say)	2	
Amnicola lustrica (Pilsbry)	6	
Campeloma decisum (Say)	1	(unit 18, lev. 1)
Gyraulus parvus (Say)	9	
Helisoma anceps (Menke)	7	
Helisoma campanulatum (Say)	5	
Physa sp.	3	
Pleurocera acutum (Raf.)	10	
Valvata tricarinata (Say)	4	(unit 11, lev. 1)
Unidentified juvenile	1	(unit 5, lev. 1)
total individuals	48	

([1] provenience of individuals listed in Table 21)

Table 23. Distribution of Fresh-Water Mussels, Corn and Nuts, and Fresh-Water Snails at the Bornick Site

unit/feature	level	mussels								plants			fresh-water snails									weight of fish bones in gms.
		Actinonaias	Lasmigona c.	Ligumia rec.	Pleurobema	Sphaeriidae	Strophitus	Amblema cos.	hinges	corn grains	hickory nut	acorn	Amnicola li.	Amnicola lu.	Campeloma d.	Gyraulus pa.	Helisoma an.	Helisoma ca.	Physa sp.	Pleurocera	Valvata tri.	juvenile	
F 1									1														5
F 2		2					1		8		-	x					2	1					22
F 3	2	1	1		1				3			x											14
	3	6	1	2	2	3	4		20	2		x								1			120
F 4		2	1		1				6														73
F 5	1	2								1	x												1
	2	2	1				1		4	4								1					10
	3											x											+
1	1			2	1				7								1		1	1			31
2	1	1		1	4		2		16	1	x	x											25
	2	1					1		2			x											1
3	1																						1
4	1	1	1	1																1			11
	2																						+
5	1	2	1	2			2	1	10	4								1		1		1	30
6	1	3	1						5	3								1					17
	2																						+
7	1						1		4											1			8
8	1	2			1		1		1														10
9	1		1				2		2														5
10	1	3	1	1	1				15	1							1						94
11	1	1		1		3	3		5					5		2					4		35
12	1	1							1	4													14
13	1	3			1		1		6	3	1t									1			113
14	1	3	1	3			2		16	3	x	x								1			53
15	1																						1
16	1			1					7		x												18
17	1	2		6	2	1	1		31	5			1	1			1						245
18	1	8	1	1			4	1	22	4	x	x	1		1	1	2			3			120
19	1	1			1		2		5	2						6		1	2				8
	2								1		1t												7
20	1								1														1
21	1										x												2
22	1								1														1
Sf																	1	1		8			

x - indicates the presence of less than a teaspoon of nut shell
t - represents one teaspoon of nut shell
+ - indicates less than one gram of fish bone

Table 24. Minimum Pounds of Meat by Animal Type and Percent of Meat from Animals by Habitat Preferences

1. animal type	mammals	birds	reptiles	fish	mussels	total
minimum lbs.	1151	18	5	925	14	2113 lbs.
2. habitat type	aquatic	dec. forest	forest-edge	grasslands		
%	49	12	31	8		100%

The breakdown of pounds of meat by habitat type was obtained by distributing the pounds of meat from a particular species according to its primary and secondary habitat preferences. Although it is difficult to estimate the amount of energy involved in exploiting an aquatic habitat compared to a forest and forest-edge, it would seem that a much greater amount of effort was expended obtaining the small mammals, fish, and birds from the waterways. The amount of effort would depend of course on the techniques of exploitation. Harvesting of at least the fish seems to be indicated by the very small size of the fish bones analyzed and the flat net-sinker. Small mesh nets and traps would have been especially effective during the spring, when most of the fish species at the site spawn. If the interpretation of bone and antler projectile points as fishing weapons is correct, this would indicate an even greater expenditure of energy on the exploitation of fish.

Meat and plant foods were not the only sources of calories at the Bornick site. The large numbers of smashed bone strewn throughout the site probably indicates the practice of making bone grease (e.g. Leechman 1951). Ninety-six percent of the mammal, bird, and reptile bones at the Bornick site are too small to identify. This practice is also indicated by the kinds of bones not smashed. These consist almost exclusively for the large herbivores of lower leg bones, which lack meat and probably were too small to bother smashing. It is interesting to mention in this context, that the Hickory nut shells from the site were also smashed into small pieces. Leonard Blake has suggested, that this "may indicate the practice described by Swanton and others of throwing finely pounded hickory nuts into boiling water and then skimming off the resulting oil from the top of the water" (pers. comm.). Both of these practices may indicate that sufficient amounts of fat were not being

obtained from the fish, mussels, and birds. Similar practices were conspicuous at the large Walker-Hooper village site.

The importance of other kinds of food is difficult to determine. Although only thirty-seven corn grains were found at the site, their scattered distribution throughout the site would seem to indicate that corn may have been quite common.

SITE FUNCTIONS

All items except storage pits, unworked flakes, ceramic waste, and miniature vessels were grouped together within their activity classes. The percentages of these classes are given in Table 25 below.

Table 25. General Activity Emphasis at the Bornick Site

activity	
1. food procurement	13.7%
2. food storage	26.9%
3. fabricating and processing	55.6%
4. recreation and ornamental	3.8%
	100.0%

LOCAL CHRONOLOGY AND EXTERNAL RELATIONSHIPS

A single radiocarbon date was obtained on wood charcoal taken from level 3 of Feature 3. The date was 660 ±50 B.P. 1290 A.D. (WIS-288). This age determination is close to five radiocarbon dates for the Walker-Hooper site. The mean of these five dates ranged between A.D. 1200 and A.D. 1240. In order to further test the degree of similarity or dissimilarity between the two sites indices of similarity were calculated using ceramics as the single most extensive artifact category at the two sites. Because there seemed to be evidence for an extended occupation at the Walker-Hooper site, the five areas of the site excavated were retained as separate entities. Large differences in the indices of similarity would support an argument for appreciable temporal and/or cultural differences between

the excavated areas of the two sites.

The method used to calculate numerical indices of similarity was based on ordination methods previously employed in ecological studies (e.g. Goodall, 1954; Bray and Curtis 1957; Curtis 1959) and in soils (Hole and Hironaka 1960; Bidwell and Hole 1964). One hundred and twenty-one ceramic variables were chosen for comparison between the five excavated areas of the Walker-Hooper site and between these and the Bornick site. Variables selected were those previously described in Classes I-XVII. An additional variable 'plain' was added where relevant. As a control, 124 variables were chosen for comparison between the Grand River phase excavations (the Walker-Hooper and Bornick sites) and two areas previously excavated and described by the writer from the Orr phase Midway site (Gibbon 1970).

The data were scaled by using proportions rather than rank correlations of frequencies in each class and then interjected into the following formulas:

Index of Similarity = I = (2W)/(A+B) X 100

Index of Dissimilarity = D = 100 - I.

The meanings of the symbols and the method of scaling the data are described by Hole and Hironaka (1960). Each of the variables was treated as an independent attribute and each class was given equal weight. However, equal value is usually not given each class or variable by archaeologists in constructing pottery "types." Methods of weighting are discussed by Hole and Hironaka (1960) and by Bidwell and Hole (1964). Although clusters of variables on units (i.e. pots) are more informative and also can be compared by similar methods, structural factors were discounted because of the fragmented nature of the pots. The calculated indices of similarity are given in the lower left portion of the matrix (Table 26) and the indices of dissimilarity are shown in the upper right part of the same table.

The taxonomic dendrogram in Figure 6 illustrates one method of arraying the excavated areas in a hierarchical classification according to the weighted variable group method of Sokal and Michener (1958). Capital letters represent primary groups established at the initial approximation. As anticipated the static relationships represented in the dendrogram segregate themselves into two separate

clusters, a Grand River and an Orr. One of the conclusions stemming from an earlier analysis of the Midway site was that the two areas excavated represent samples of a single occupation unit over a relatively brief period of time. If this conclusion is correct and i the Walker-Hooper site has a single Grand River phase component as concluded in a previous study (Gibbon 1969), the level of association of areas within the two phases generates the testable hypothesis, that most Oneota components or large excavated areas within a site in Wisconsin would associate between 80-85 on the dendrogram. This is a measure of intra-culture ceramic variability, resulting, perhaps, from residence rules, marriage patterns, and activity differentiation.

Despite its location in a widely different geographical area, the Bornick site ceramic sample is actually closer to some Walker-Hooper site areas (i.e. Group A), then some are to each other (i.e. Group A and B). The numerical values and the dendrogram sustain the conclusion, that the site is closely related to the Walker-Hooper Grand River phase type-site and occurs in or very near its span of occupation.

SUMMARY

The Borcnick site is a small, probably single family habitation site near White Lake and the Grand Marsh in Marquette County, Wisconsin. It is clearly a component of the Grand River phase, whose heartland is around the Grand Marsh and along the Fox and Grand Rivers in Green Lake and Marquette Counties. The isolated position of the site in woodland well back from the marsh and major waterways suggests a defensive and/or winter setting. The location of the large, stockaded Walker-Hooper site, which is some distance up the Grand River, a small tributary of the Fox River, may also be defensive. A wide range of male and female work activities are evident, particularly fabricating and processing activities and food storage. The main subsistence activities were the exploitation of aquatic resources and the hunting of white-tailed deer. Horticulture may also have been a primary subsistence activity of the inhabitants, but its importance is difficult to determine from the data. A single radiocarbon determination (WIS-288)

	Walker-Hooper site							Bornick	Midway site		
Area	1-a	1-b	1 total	2	3	4	5		1	2	total
1-a		14.8	X	21.5	21.3	16.1	14.7	17.9	33.4	30.9	34.7
1-b	85.2		X	21.5	21.5	20.1	16.5	19.2	31.4	32.6	31.7
1 total	X	X		19.3	19.8	15.8	13.6	16.4	30.9	29.2	29.6
2	78.5	78.5	80.7		18.3	22.4	18.9	22.5	37.5	35.8	37.0
3	78.7	78.5	80.2	81.7		20.2	18.4	22.2	37.1	35.3	36.4
4	83.9	79.9	84.2	77.6	79.8		16.6	23.8	33.6	32.3	32.8
5	85.3	83.5	86.4	81.1	81.6	83.4		20.3	32.0	30.8	31.3
Bornick	82.1	80.8	83.6	77.5	77.8	76.2	79.7		36.8	35.5	35.8
Midway 1	66.6	68.6	69.1	62.5	62.9	66.4	68.0	63.2		14.2	X
Midway 2	69.1	67.4	70.8	64.2	64.7	67.7	69.2	64.5	85.8		X
Midway total	65.3	68.3	70.4	63.0	63.6	67.2	68.7	64.2	X	X	

Table 26 . Similarity Matrix for Ceramic Variables from the Walker-Hooper, Bornick, and Midway sites

places the site in the latter half of the thirteenth century (A.D. 1290 ± 50).

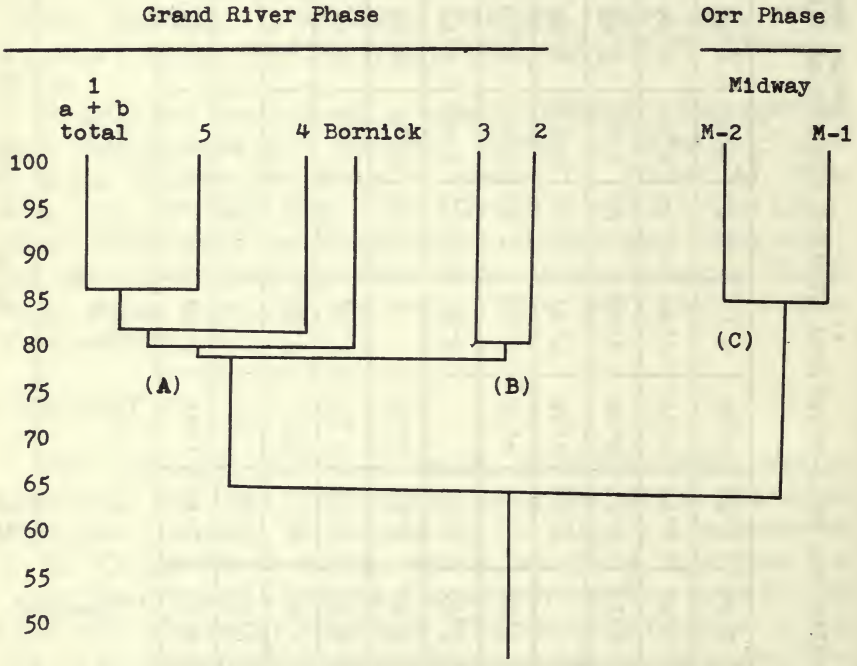


Figure 6 . Dendrogram Showing Increasing Degrees of Similarity between Individual Excavation Areas (1-5 represent the five excavated areas at the Walker-Hooper site)

APPENDIX A

Table 27. Attribute Associations and Measurements of Vessels (all vessels are plain)

unit/ feature	level	Class						mean width in mm.				exterior color	interior color	diameter of rim (cm.)
		I	IV	V	rim height	XI	XII	should.	neck	rim	lip			
F 4	-	1	1	2	37	1	1	7	11	9	6	5	2	
1	1[a]	3	2	2	28	1	1	7	9	9	8	1	1	
5	1	1	6	2	18	1	1	7	10	9	8	4	4	
5	1[b]	2	1	1	38	1	1	5	7	7	7	3	3	
5	1	3	5	2	24	1	1	8	11	8	6	1	-	
5	1	2	1	2	49	1	1	5	9	9	5	2	4	
16	1	1	3	2	14	1	1	5	12	11	7	2	2	24
16	1[c]	1	2	2	27	1	1	6	10	9	7	2	2	
17	1	1	3	2	28	1	1	6	11	9	5	5	5	
19	2	1	3	2	18	1	1	10	12	10	5	5	5	
Sf		1	2	2	26	1	1	6	8	7	5	3	3	
Sf		1	2	2	25	1	1	7	9	8	6	3	3	

a. part also in level 1 of units 14 and 22; b. part in level 1 of unit 17; c. part in level 1 of unit 22 ; - = absent information
colors - 1. yellowish-brown, 2. brown, 3. reddish-brown, 4. gray, 5. black

Table 28. Attribute Associations and Measurements of Miniature Vessels

unit	level	Class														mean width in mm.				ext. color	int. color	diameter of rim (cm.)
		I	II	III	IV	V	rim ht.	IX	X	XI	XII	XIII	XV	XVI	XVII	should.	neck	rim	lip			
17	1	2	0	0	6	1	14	0	0	1	1	8	4	8	1	2	3	4	3	2	5	4
Sf		1	0	0	6	1	9	0	0	1	1	0	0	0	0	5	5	4	3	1	1	
Sf		1	0	0	6	2	9	3	1	1	1	0	0	0	2	5	5	4	3	1	1	
fragments																						
1	1	1	1	3	6	3	12	0	0	1	1	-	-	-	-	-	2	3	3			
4	1	7	0	0	6	0	5	0	0	1	1	-	-	-	-	-	-	-	3			
7	1	1	0	0	6	-	11	0	0	1	1	-	-	-	-	-	-	-	3			
9	1	2	4	1	6	2	10	0	0	1	1	-	-	-	-	-	6	5	4			
14	1	-	-	-	-	-	-	-	-	1	1	5	4	-	-	-	-	-	-			
16	1	6	0	0	6	3	-	0	0	-	-	-	-	-	-	-	-	5	6			
17	1	2	0	0	6	2	10	0	0	1	1	-	-	-	-	-	5	4	3			
Sf		1	0	0	6	2	11	0	0	1	1	-	-	-	-	-	5	4	3			

0 = undecorated; - = absent information; colors the same as in Table 25

Table 29. Weight of Shell Tempered Sherds, Distribution of Round Shell Tempered Necks, Number of Plain Shell Tempered Sherds, and Decorated Shoulder Sherd Techniques and Elements from the Bornick Site

unit/feature	level	sherd weight in gms.	round necks (with) plain shoulders *		plain sherds	decorated shoulder sherds					
						no.	class XIII	class XIV	class XV	class XVI	sherd design elements
F 1	NVC	85	0	0	0	0	-	-	-	-	-
F 2	NVC	383	0	0	46	0	-	-	-	-	-
F 3	2	255	1	0	87	1	1	2	1	-	1
	3	454	2	0	144	1	5	1	1	2	-
						1	1	3	3	-	7
						1	1	2	2	-	6
						3	1	2	1	-	1
						4	1	3	1	-	1
F 4	NVC	343	0	0	100[a]	1	1	3	1	1	-
						1	1	2	1	-	1
						1	1	3	1	-	1
F 5	1	128	0	0	12	0	-	-	-	-	-
	2	113	0	0	26	1	1	2	1	-	1
						2	1	3	1	-	1
	3	43	1	0	3	0	-	-	-	-	-
1	1	414	3	0	145	1	1	2	2	-	5
						3	1	2	1	-	1
						4	1	3	1	-	1
2	1	454	1	0	85	1	1	2	1	-	3
						1	1	2	1	-	1
	2	47	0	0	21	0	-	-	-	-	-
3	1	28	0	0	11	0	-	-	-	-	-
4	1	244	0	0	109[a]	1	5	1	1	2	-
						1	1	1	2	-	5
						1	6	-	4	-	9
						1	1	2	2	-	5
						1	1	2	1	-	1
						1	1	3	1	-	1
	2	28	0	0	7	1	1	3	1	1	-
5	1	170	3	0	203	1	1	2	1	3	-
						1	5	1	1	-	1
						1	1	1	1	-	1
						1	1	2	1	-	1
						2	1	3	1	-	1
6	1	255	0	0	111[a]	1	1	1	1	-	1
						1	1	2	1	-	1
	2	14	0	0	5	1	1	2	1	-	1
7	1	284	1	0	91	1	1	3	1	-	1
8	1	198	0	0	100	2	1	2	1	-	1
						1	1	3	1	-	1

(Table 29 - Continued)

unit/feature	level	sherd weight in gms.	round necks (with) plain shoulders		plain sherds	decorated shoulder sherds					
						no.	class XIII	class XIV	class XV	class XVI	sherd design elements
9	1	159	0	0	48	1	1	2	1	-	1
10	1	573	2	0	273	1	4	-	4	-	9
						1	7	-	4	-	9
						1	5	2	1	-	1
						1	1	1	1	-	1
						2	1	2	1	-	1
11	1	556	4	0	154	1	5	2	1	1	-
						1	1	1	2	-	6
						1	1	2	1	-	1
						1	5	3	1	-	1
12	1	113	0	0	47	1	5	2	1	1	-
						1	1	2	1	-	1
13	1	743	1	0	271	1	1	2	1	3	-
						1	1	2	1	-	3
						2	2	2	5	-	8
						1	1	1	2	-	5
						1	5	1	1	-	1
						3	1	2	1	-	1
						3	1	3	1	-	1
14	1	941	4	0	411	1	1	2	1	4	-
						1	1	3	1	-	3
						1	1	1	1	1	-
						1	1	1	1	3	-
						1a	5	1	3	5	-
						5	1	2	1	-	1
						2	1	3	1	-	1
						1	1	2	2	-	5
15	1	57	1	0	13	1	4	-	4	-	9
16	1	624	1	0	210	1	7	-	4	-	9
						1	1	1	1	1	-
						2	1	2	1	-	1
						1	1	3	1	-	1
17	1	947	2	0	339	1	1	3	1	3	-
						1	1	2	2	-	6
						1	1	3	1	-	2
						1	5	1	1	-	1
						4	1	2	1	-	1
						3	1	3	1	-	1
						2	4	-	4	-	9
18	1	1429	2	0	331	1	1	2	1	-	3
						1	1	2	1	-	3
						1	3	-	4	-	9

Table 30. Attribute Associations of Unattached Shell Tempered Lips and Rims from the Bornick Site (all measurements in mm.)

		unattached rims											unattached lips								
unit/feature	level	class I	class II	class III	class IV	class V	rim height	class VII + IX	class VIII + X	neck thickness	rim thickness	lip thickness	no. of lips	class I	class II	class III	class VII	class VIII	class IX	class X	lip thickness
F3	2	1	0	0	6	-	14	0	0	-	-	4	2	2	0	0	0	0	0	0	-
													1	1	0	0	0	0	0	0	-
	3	1	0	0	1	2	38	0	0	8	8	5	3	1	0	0	0	0	0	0	-
		1	0	0	2	2	21	0	0	8	7	6	1	4	0	0	0	0	0	0	-
		2	0	0	5	2	21	0	0	11	9	7	2	5	0	0	0	0	0	0	5
													3	2	0	0	0	0	0	0	-
													1	1	3	1	0	0	0	0	-
F4	-	2	0	0	1	2	39	0	0[a]	7	6	4									
F5	1	1	0	0	6	-	17	1[a]	1[a]	-	-	-	1	2	0	0	0	0	0	0	-
1	1	1	0	0	6	2	17	0	0	6	5	4	2	1	0	0	0	0	0	0	-
		2	0	0	2	2	25	0	0	7	6	5	3	2	0	0	0	0	0	0	-
2	1	1	0	0	1	3	36	0	0	8	9	4	1	2	0	0	0	0	0	0	-
		2	0	0	2	2	27	0	0	8	7	6	1	5	0	0	0	0	0	0	6
													1	3	0	0	0	0	0	0	6
4	1	1	0	0	6	1	12	0	0	5	5	4	3	5	-	-	-	-	-	-	-
													1	3	0	0	0	0	0	0	6
5	1	3	0	0	2	3	25	0	0	7	8	5	1	1	2	2	0	0	0	0	-
		1	0	0	6	-	16	0	0	-	-	5	1	1	0	0	0	0	0	0	3
		1	0	0	6	-	17	0	0	-	5	4	1	1	1	3	0	0	0	0	-
		1	2	2	6	-	17	0	0	-	6	5	2	2	0	0	0	0	0	0	-
													1	3	0	0	0	0	0	0	6
6	1												2	1	0	0	0	0	0	0	-
													1	2	0	0	0	0	0	0	-
7	1	1	0	0	2	1	28	0	0	8	8	6									
8	1	2	0	0	7	2	8	0	0	9	8	7	2	1	0	0	0	0	0	0	-
													1	2	0	0	0	0	0	0	-
													1	3	0	0	0	0	0	0	6
9	1												3	1	0	0	0	0	0	0	-
													1	3	0	0	0	0	0	0	-
10	1	3	0	0	6	2	16	0	0	6	5	4	3	1	0	0	0	0	0	0	-
													1	1	0	0	0	0	1	1	-
													1	2	0	0	0	0	0	0	-
11	1												3	1	0	0	0	0	0	0	-
													1	3	0	0	0	0	0	0	4
													1	2	0	0	0	0	0	0	-
													1	5	0	0	0	0	0	0	5
13	1	2	0	0	2	2	20	0	0	8	7	5	6	1	0	0	0	0	0	0	-
		2	0	0	2	2	27	0[b]	0[b]	-	7	4	4	2	0	0	0	0	0	0	-
		1	0	0	2	1	24	1[b]	1[b]	6	6	5	3	5	0	0	0	0	0	0	-

(Table 30 - Continued)

unit/feature	level	unattached rims											unattached lips								
		class I	class II	class III	class IV	class V	rim height	class VII + IX	class VIII + X	neck thickness	rim thickness	lip thickness	no. of lips	class I	class II	class III	class VII	class VIII	class IX	class X	lip thickness
14	1	2	0	0	3	2	17	0	0	14	10	6	5	1	0	0	0	0	0	0	-
		1[c]	2	2	6	1	12	0	0	5	5	4	6	2	0	0	0	0	0	0	-
													1	5	0	0	0	0	0	0	6
													2	3	0	0	0	0	0	0	-
16	1	1[c]	0	0	3	2	13	0	0	11	9	6	1	1	0	0	0	0	0	0	-
													1	1	0	0	1	1	0	0	-
													2	2	0	0	0	0	0	0	5
													1	3	0	0	0	0	0	0	8
17	1	1	0	0	2	1	29	0	0	7	7	4	8	1	0	0	0	0	0	0	-
		1	0	0	6	1	17	0	0	5	5	5	1	1	0	0	1	1	0	0	-
													5	2	0	0	0	0	0	0	-
													1	3	0	0	0	0	0	0	5
													2	4	0	0	0	0	0	0	-
18	1	2	0	0	1	2	51	0	0	11	9	7	3	1	0	0	0	0	0	0	-
		2	0	0	-	2	-	0	0	-	9	7	1	1	0	0	0	0	1	1	-
		1	0	0	5	2	22	0	0	11	9	5	2	2	0	0	0	0	0	0	-
		1	0	0	2	2	28	0	0	-	9	6	1	5	0	0	0	0	0	0	5
		1	0	0	6	3	11	0	0	4	5	5									
19	1												1	1	0	0	0	0	0	0	-
													2	2	0	0	0	0	0	0	-
													1	2	0	0	0	0	1	1	-
													2	3	0	0	0	0	0	0	-
	2												1	1	0	0	0	0	0	0	5
22	1	2	0	0	2	-	26	0	0	-	7	5	1	1	0	0	0	0	0	0	-
													2	2	0	0	0	0	0	0	-
													1	5	0	0	0	0	0	0	5
Sf		1	0	0	6	-	17	0	0	-	-	7	48	1	0	0	0	0	0	0	-
		1	0	0	6	1	15	0	0	6	6	3	2	1	3	1	0	0	0	0	-
		1	0	0	6	2	10	0	0	5	4	3	1	1	0	0	0	0	2	2	-
		1	0	0	1	1	36	0	0	9	9	4	20	2	0	0	0	0	0	0	-
		1	0	0	2	1	35	1[a]	1[a]	7	7	6	11	5	0	0	0	0	0	0	-
		1	0	0	1	2	42	0	0	-	7	5	8	3	0	0	0	0	0	0	-
		1	0	0	-	-	-	0	0	-	9	6	1	4	0	0	0	0	0	0	-
		3	0	0	1	2	36	0	0	9	8	4									
		2	0	0	2	2	33	0	0	8	6	4									
		2	0	0	1	2	43	0	0	10	9	8									
		2	0	0	1	2	40	1[b]	1[b]	9	8	7									
		1	0	0	2	2	20	0	0	8	6	4									
		1	0	0	2	1	27	0	0	5	5	4									

(Table 30 - Continued)

unit/feature	level	unattached rims										
		class I	class II	class III	class IV	class V	rim height	class VII + IX	class VIII + X	neck thickness	rim thickness	lip thickness
Sf		3	0	0	2	2	20	0	0	8	7	4
		3	0	0	2	1	25	0	0	7	7	4
		2	0	0	2	1	30	0	0	8	8	6
		3	0	0	2	1	27	0	0	8	8	5
		2	0	0	2	-	29	0	0	-	-	5
		2	0	0	2	2	21	0	0	8	7	5
		1	0	0	2	1	28	0	0	6	6	4
		1	0	0	1	3	36	0	0	-	9	4
		3	0	0	4	2	24	0	0	9	8	5
		1	0	0	3	2	15	0	0	11	9	5
		2	0	0	3	1	17	1[b]	1[b]	5	5	3
		2	0	0	6	1	15	0	0	-	7	7

a - classes VII and VIII

b - classes IX and X

c - one sherd with hole drilled in from exterior

0 - undecorated

- - absent information

note: the width of most lip fragments was not measured.

Table 31. Measures of Dispersion for Unattached Rims from Large Jars

	mean (mm.)	kurtosis	standard deviation	skewness	variance	range (mm.)	observations
1. rim height	24.0	-0.27	9.67	0.60	93.44	5 - 51	56
2. lip width	5.0	-0.49	1.20	0.47	1.45	3 - 8	57
3. rim width	7.1	-1.05	1.57	-0.16	2.46	4 - 10	53
4. neck width	7.7	0.28	2.17	0.53	4.70	4 - 14	43

Table 32. Weight of Stone Debitage, Fire-Cracked Rock, and Miscellaneous Stone Debitage from the Bornick Site

unit/feature	level	decortication fk	shatter	bipolar flakes	stone debitage weight in gms.	fired rock	unworked chert flakes			unworked quartzite flakes			unworked chert chips		
							end str.	side str.	w/o	end str.	side str.	w/o	end str.	side str.	w/o
F 1	NV		1		6.5		1		6		1				
F 2	NV		1		18.0		5		9		1		1		
F 3	2	1	1		50.7		6		16		1	2			
	3		3		78.1		15	2	35	2	1	4			
F 4	NV	1	2	1	41.1	7	9	2	18	1		3			
F 5	1				8.1				1			1			
	2				5.2		1		2						
1	1	2	1	2	23.7		2	1	5	3	1	2			
2	1	2	2		53.1		4	2	13	2	[illegible]	8			
	2				7.0				4	1	[illegible]	1			
4	1		1	1	18.4		2	1	4	1	1	5			
	2				1.9				2						
5	1	2	2	2	33.1		2		7	[illegible]		19			
6	1				32.6		4		8	[illegible]	2	3			
	2				1.5				2						
7	1	2			17.9		2	1	3	2	2	3			
8	1	1	1	1	10.4		2		4		2	1			
9	1				3.8				1	4	1	1			
10	1	2	2		57.7		4	3	13	2	1	9			1
11	1	1			31.3			1	2	3	6	2			12
12	1				6.2		1					2			
13	1		8	1	33.2		5	2	15	2	3	6	1	1	5
14	1	3	4	1	51.1		8	4	9	7	1	10			
15	1			1	4.5							1			
16	1	2	1		12.8		8		8	3	1	2			
17	1		2	1	52.4		9	3	18	5	2	22	1		
18	1	1	3		23.9		3	3	9	1		7	[illegible]	1	4
19	1				8.0				2	4					
	2	1	1		139.2				4						
20	1				+					1					
21	1		1		17.3		2	2	4	1	1				
22	1		1		9.5		2		2			6			

Table 33. Provenience of Sub-Categories of Utilized Flakes from the Bornick Site

unit/feature	level	side retouch								end retouch				side+end	
		unifacial					bifacial			unifacial			bifa.	unif.	bifa.
		single			both		single		bo	sin.		both	si bo	sin.	both
		end str.	side str.	w/o	end str.	w/o	end str.	side str.	w/o w/o	side str.	w/o	side str.	w/o	w/o	w/o
F 1	NV								1						
F 2	NV								1		1				
F 3	2	1				1	1				1				
	3		1						1						
F 4	NV	2							1				1	1	
F 5	1										1				
	2	1													1
	5	1	1		1			1							
	6	1									1		1.		
	7	1							1						
	8	1		1							1				
	10	1		2							1				
	12	1							1	1					
	13	1							1						
	14	1									1				
	17	1		1						1					1
	18	1							1		1				
	19	1						1							
	21	1										1	1		
	22	1					1								
Sf	-	1	1	2	3				1	1			1	1	

BIBLIOGRAPHY

Bidwell, O.W. and F.D. Hole. 1964. An Experiment in the Numerical Classification of Some Kansas Soils. SOIL SCIENCE SOCIETY OF AMERICA PROCEEDINGS, 28 (No. 2): 263-268.

Binford, Lewis R. and G.I. Quimby. 1963. Indian sites and chipped stone materials in the northern Lake Michigan

area. FIELDIANA ANTHROPOLOGY, 36(No. 12):277-307.
Bray, J.R. and J.T. Curtis. 1957. An Ordination of the upland forest communities of southern Wisconsin. ECOLOGY MONOGRAPH 27: 325-349.
Cleland, C.E. 1966. THE PREHISTORIC ANIMAL ECOLOGY AND ETHNOZOOLOGY OF THE UPPER GREAT LAKES REGION. Anthropological Papers of the Museum of Anthropology, University of Michigan, No. 29. Ann Arbor.
Cook, Ina. 1851. Land Survey of Montello Township, Marquette County. MS, Office of the Clerk of the Commissioners of Public Lands, Madison, Wisconsin.
Curtis, John T. 1959. THE VEGETATION OF WISCONSIN. University of Wisconsin Press, Madison, Wisconsin.
Gibbon, Guy E. 1969. The Walker-Hooper and Bornick Sites: Two Grand River Phase Oneota Sites in Central Wisconsin. Unpublished Ph. D. Dissertation, University of Wisconsin, Madison.
Gibbon, Guy E. 1970. The Midway Village Site. THE WISCONSIN ARCHEOLOGIST, 51 (3): 79-162.
Goodall, D.W. 1954. Vegetational Classification and Vegetational Continua. In FESTSCHRIFT FUR ERWIN AICHINGER ZUM 60 GEBURTSTAG. Sonderfolfe der Schriftenreihe. Angewandte Pflanzen-soziologie. 1:168-182. 2 vol.
Griffin, J.W. 1946. The Upper Mississippi Occupation at the Fisher Site, Will County, Illinois. Master's thesis, University of Chicago, Chicago.
Hall, Robert L. 1962. THE ARCHEOLOGY OF CARCAJOU POINT. University of Wisconsin Press, Madison.
Hole, F.D. and M. Hironaka. 1960. An experiment in ordination of some soil profiles. SOIL SCIENCE SOCIETY OF AMERICA PROCEEDINGS, 24:309-312.
Hurley, William H. 1966. The Silver Creek sites (47-Mo-1 to Mo-5): a complex of five Woodland site locations in Monroe County, Wisconsin. Master's thesis, University of Wisconsin, Madison.
Leechman, Douglas. 1951. Bone Grease. AMERICAN ANTIQUITY, 16: 355-356.
Sokal, R.R. and C.D.A. Michener. 1958. A Statistical Method for Evaluating Systematic Relationships. UNIVERSITY OF KANSAS SCIENCE BULLETIN, 38: 1409-1438.

A CACHE FROM JACKSON COUNTY
David Kriesel

A cache of 74 blades was found in a sand bank near the Black River, North Bend Township, Jackson County. They are of quartzite and range in size from 2 1/4 to 7 1/2 inches. They were lying one on top of another stacked like cordwood. All are in perfect condition and show no signs of use. Such caches are of a Late Archaic tradition dating some time during the first millennium B.C.

THE BOOKSHELF

THE NAOMIKONG POINT SITE AND THE DIMENSIONS OF LAUREL IN THE LAKE SUPERIOR REGION by Donald E. Janzen Anthropological Papers, Museum of Anthropology, University of Michigan, No. 36, 17 Tables, 21 Plates, 141 Pages. Ann Arbor, 1966. $3.

This monograph will be of much interest to students of Wisconsin prehistory. The Laurel material from Naomikong Point as well as that from two sites on the Door Peninsula of Wisconsin (Mason, 1966 and 1967) are southern examples of what has been called "Lake Forest Middle Woodland" or "Northern Middle Woddland." Laurel extends eastward from central Saskatchewan at Squaw Rapids (a site briefly visited by the reviewer) to northern Ontario. Point Peninsula II of New York State shows some cultural similarities. Laurel culture seems to have been an adaptation of Middle Woodland peoples to a Lake Forest ecology. Hopewell, such as that of Illinois, probably influenced Laurel at least along the southern edges.

Janzen's site is located to the west of twin points on Naomikong Point on Lake Superior's south shore in the Upper Peninsula of Michigan, Chippewa County. Two excavation seasons were spent at the site, 1966 and 1967, with a preliminary survey test made during the previous year; two of the seasons were sponsored by the National Science Foundation. The author directed the last season's work.

The report is divided into five parts: Introduction, excavation, artifact description, interpretation, and Northern Middle Woodland relationships. In addition there are two appendices: I. Chi-Square Tables for Ceramic Attribute Associations, and II. Correlation Coefficients over .80 for Artifact and Non-Artifact Relationships.

The Introduction briefly covers the "History of Investigations" and adequately describes the geology, flora and fauna, geography, and prehistoric physical setting. A map is included to show the "Biotic Provinces of the Upper Great Lakes," the same used in other Michigan reports (note remarks regarding this map in earlier Bookshelf reviews concerning Wisconsin) and places the site in the Canadian biotic province, a Lake Forest floral assemblage. It is suggested that the earliest possible date

for occupation of the shoreline site is 250 B.C., since the present shoreline came into existence around that date. Later the author puts the site in the upper limits of Laurel's temporal span from the time of Christ to about A.D. 450. A radiocarbon date of A.D. 430 (M-2055) was obtained from charred "food" on a Laurel pseudo-scallop shell Naomikong Point variety vessel.

Although a small amount of Late Woodland cultural material was present, as well as historic Chippewa traces dating around 1850, the majority of the artifacts could be classified as Laurel, and the analysis of the latter is the basis of the report. No other Laurel site matches the yield of ceramics at Naomikong Point. Large areas of the site were excavated to reveal "group size, subsistence pattern and settlement pattern, and exploitation of natural resources."

The author feels there is "very little of the right kind of data from other archaeological sites to test this model" or probing the cultural dimension. Attempts were made to correlate task areas with artifact and non-artifact distribution. Five 20 by 20 foot units were used for this purpose, either contiguous, or connected with lateral trenches, some extending into the beach. No instances of stratification separating midden zones occurred except one discontinuity. A total of 47 features were identified, described and their contents listed, and their locations plotted on an excavation map. The author believes the "post molds and features... may represent the fish smoking areas of the site."

Ceramic descriptions were made so both attribute and typological analysis approaches would be useful. The author criticizes J.V. Wright's "Laurel Tradition and the Middle Woodland Period" (National Museum of Canada, Bulletin 217) for using only an attribute analysis. A table is included showing the frequency and distribution by excavation unit of the decorated body sherd attributes. He makes a valuable observation that there are idiosyncrasies of degrees of variation in single pots regarding variation in lip, rim, and body thickness, as well as rim profile, that would foil the archaeologist in pottery classification. Only partially reconstructable vessels were recovered at the site. These reveal a conical shape with rim diameter about three-fourths of vessel height. Five ceramic types and one variety were described in the Middle Woodland assem-

blage with type designated as Laurel Psuedo-scallop, Laurel Linear Stamp, Laurel Plain, Laurel Dentate, Laurel Incised; and Laurel Pseudo-scallop shell–Naomikong Point Variety. The Late Woodland Pottery was Mackinac Ware. The author's hypothesis is "that dentate and simple tool-decorated pottery represent a cultural change through time, and that the latter succeeds the former."

The stone industry is divided into finished stone artifacts and chippage debris that is also analyzed. Of interest are the six small unworked obsidian flakes found in the midden that were obtained from Yellowstone Park's Obsidian Cliff; all other material is derived locally.

Only 49 projectile points were recovered. These were side-notched and stemmed, one large Snyder's point of Illinois Hopewell and diagnostic side-notched points with a flaring convex base that resembles the Stott Corner-notched point of Manitoba. There were also Late Woodland triangular points present. Other stone artifacts were preforms (more commonly called bifacial blades), scrapers (with nearly two thousand examples and only a sample adequately considered in the analysis), five drills, retouched flakes, net sinkers, hammerstones, celts, and pestles. Copper awls, beads, cones and possible fish hooks and a possible tip of a bone harpoon were other non-lithic artifacts.

Faunal remains revealed that mammal bone exceeded fish bone by a ratio of 15 to 1 in weight, yet the large number of net sinkers suggested a fishing site and that the fish bone had disappeared in the acid soil. The author concludes regarding settlement pattern that "rather than a community-wide cooperative fishing effort, it appears more likely that each household, or extended family, acted as an independent unit with net sinkers (or nets) kept in the vicinity of their living areas . . .this type of fishing parallels the Chippewa fishing practices."

In the last section the site is compared with other cultures of the Northern Middle Woodland: Laurel, North Bay, Saugeen, and Point Peninsula. There is an interaction of these people as well as influence from the Hopewell interaction sphere. All Laurel sites are adjacent to either lakes or rivers suggesting favorable fishing locations. There is a high frequency of side and end scrapers substantiating that unifacial tools are more frequent at fishing stations. All Laurel sites have "a ceramic assem-

blage which derives its decorative elements from a common attribute pool.'' Stone material is converted into finished artifacts on the sites. Sites are of great variability in size suggesting seasonal economy with large fishing camps during spawning season.

The excavation of this important site has been of high value to Great Lakes archaeology and the analysis and report are models to follow.

Thomas F. Kehoe,
Milwaukee Public Museum

THE PREHISTORY OF THE BURNT BLUFF AREA, Assembled by James E. Fitting. Anthropological Papers, No. 34, Museum of Anthropology, University of Michigan, Ann Arbor, 1968. 140 pp., $3.

Burnt Bluff is on the southwestern tip of the Garden Peninsula of Lake Michigan's northern shore. Pictographs and caves on the imposing limestone cliffs drew the attention of both summer visitors and archaeologists, and stimulated the landowner of the Burnt Bluff area to build stairs giving access to the prehistoric remains. These stairs facilitated the fieldwork conducted in 1963 and 1965 by University of Michigan crews; the report does not state, but one may guess, that the stairs increase the likelihood of ignorant visitors injuring the remains, so that a measure of salvage was involved in the Michigan crew's work.

This volume on the prehistory of the Burnt Bluff area comprises two excavation reports, a discussion of the geology of the area, descriptions of textiles and rock paintings from the Burnt Bluff Site, and a survey of northern Lake Michigan lithic industries, plus introduction and summary by the volume's assembler, James E. Fitting. The publication's printing is clear and attractive, and the plates are good except for those illustrating Fitting's paper on the lithic industries, where too much contrast in the photographs obscures the outlines of the artifacts. Michigan's proofreader let slip several spelling errors, but the meaning of the text is not affected.

''The Spider Cave Site,'' by Charles E. Cleland and G. Richard Peske, will most interest readers of this journal. The cave, ninety feet long by thirty feet deep, is twenty feet above the lake in a bluff 150 feet high. Geological study

suggests the cave was formed some 4000 years ago. Cleland and Peske made test excavations in the cave in 1963, supplementing their finds with the collection from the cave lent by the landowner, Mr. Henry Lang. Since the rocky debris on the floor of the cave showed no stratigraphy, Mr. Lang's material could be massed with the archaeologists' in their analysis of the cave's occupation.

Nearly all the artifacts from Spider Cave were projectile points. Many of the points had shattered tips, and the flakes detached upon impact were found close to several of the tip-shattered points, demonstrating that the points had been shot into the cave. This circumstance, with the preponderance of Middle Woodland points and lack of ordinary habitation remains, led Cleland and Peske to conclude that the cave had mystical significance to the Middle Woodland Indians, that they shot projectiles into it as they passed in their canoes, as Indians were observed to do in the eighteenth century when they passed a pictograph-adorned cliff on Crooked Lake, Minnesota.

Dating for Spider Cave could only be performed by comparison of the points from its floor with specimens excavated from stratified occupation sites in the region, particularly the sites described by Mason on the Door Peninsula. A Middle Woodland period for most of the points is supported by the presence of socketed toggle head harpoons, which Mason believes to be diagnostic of Middle Woodland on upper Lake Michigan. Cleland and Peske divide the bulk of the Spider Cave points into six types, some including more than one variety. They use form as their principal criterion, and give each type a local name, though they point out comparisons with other named types. In an extended discussion of the points' metric attributes, the authors explain their weighting of form over measurements in classification. Their analysis is clear and useful, if not particularly ambitious.

Donald E. Janzen's report on "Excavations and Survey at Burnt Bluff in 1965" concentrates on the work at cave B-95. Only fourteen artifacts were found in Janzen's investigation of this inhabited shelter, but the inventory includes a bark rope, two bark fabric fragments (one plaited, one twined), a fragment of European wool cloth, four wooden artifacts (all of problematic function), and two projectile points (one corner-notched, one side-notched).

In addition, human bones attributable to two infants, a child, and three young adults were recovered. Faunal analysis of other bones, conducted to the meticulous depth we have come to expect of Cleland and the other younger archaeologists from Michigan, revealed that the shelter was probably used for a short period in the spring by a small group of hunter-fishers.

"The Burnt Bluff Rock Paintings" are discussed by Douglas W. Lugthart. Relying heavily upon Dewdney and Kidd's INDIAN ROCK PAINTINGS OF THE GREAT LAKES (Toronto, 1962), Lugthart considers the paintings to be of Ojibwa origin. Several motifs seems referable to Midewiwin symbols, but others are either too simple or too poorly preserved to be thus interpreted. Two paintings showing human figures with curved lines extending from phallic projections are denoted by Lugthart as men urinating, but could as likely be men ejaculating or men dancing wearing breechcloths decorated with an animal tail. As Lugthart realizes, the only certain conclusion to be drawn from these pictographs is that to our eyes their meaning is ambiguous.

Fitting's paper on "Northern Lake Michigan Lithic Industries" compares ten sites, five from the Burnt Bluff area and five elsewhere in Michigan. Placing lithic analyses in the context of ecologoical settings, Fitting uses his familiar contrasts between the Chippewas' northern hunting-fishing economy and the hunting-fishing-farming village-based life of groups such as the Ottawa in the Carolinian biotic province, assigning the ten small sites to one or the other pattern insofar as the meager data permit. The paper is a fine example of how archaeological data can be viewed as, in Gordon Childe's metaphor, the fossils of human societies, not merely objects for classification.

These four papers, with Prahl and Farrand's discussion of the postglacial history of the Burnt Bluff area and Volney Jones' short report on the fabrics discovered by Janzen, add up to a stimulating review of the prehistory of a typical northern Great lakes region.

Alice B. Kehoe,
Marquette University

1971 ARCHEOLOGICAL SHOW AWARD WINNERS

The first archeological show sponsored by the Wisconsin Archeological Society was held in Milwaukee on May 16, 1971. Five of the exhibitors were judged to have had the best displays. Receiving the award plaque were: Phillip Wiegand, Milwaukee; Paul Koeppler, Milwaukee; Robert VanderLeest, Milwaukee; Gary Litherland, Kankakee, Ill.; and Darwin DeCamp, Joliet, Ill.

BOOKS RECEIVED

DRAWING ARCHAEOLOGICAL FINDS by Conant Brodribb. Association Press, N.Y. 1971. Price: $4.95.

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(First number-Volme, second number-Page)
QUICK GUIDE TO VOLUME NUMBERS

Old Series	Vol. 5 - - - - - - - - - - - - 1926
Vol. 1 - - - - - - - - - - - - 1901	Vol. 10 - - - - - - - - - - - - 1930
Vol. 5 - - - - - - - - - - - - 1905	Vol. 15 - - - - - - - - - - - - 1935
Vol. 10 - - - - - - - - - - - - 1911	Vol. 20 - - - - - - - - - - - - 1940
Vol. 15 - - - - - - - - - - - -1916	Vol. 25 - - - - - - - - - - - - 1944
Vol. 20 - - - - - - - - - - - - 1921	Vol. 30 - - - - - - - - - - - - 1949
New Series	Vol. 35 - - - - - - - - - - - - 1954
Vol. 1 - - - - - - - - - - - - 1922	Vol. 40 - - - - - - - - - - - - 1959

ABLER, THOMAS S.
Pipes and Pottery of the DuBay Site n45-127.
ACHEN, FRANK
Some Points from Lake Monona n37-85.
ADAMS, VINA SHERWOOD
Mandoka n14-41.
ALBERTS, ROBERT C.
Trade Silver and Indian Silver Work--Great Lakes Area n34-1.
The Albert Green Heath Collection n37-51.
ALBRIGHT, JAMES G.
Exploration of a Mound on Fox Island in Rest Lake, Vilas County o2-14.
ALFRED, LORRAINE
King George II Indian Peace Medal n16-4.
Literature on Wisconsin Shellheaps and Artifacts n17-20.
Menomini Indian Medals n14-95.
Orrin Thompson n15-10.
ALLER, WILMA F.
Aboriginal Food Utilization of Vegetation by the Indian of the Great Lakes Region--as recorded by the Jesuit Relations n35-59.
ANDREW, WILLIAM K
A Fluted Stone Axe n18-75.
ANDREWS, ALICE B
The Yuma Point n15-45.
BABCOCK, WILLOUGHBY M.
A Minnesota Banner Stone n5-62.
A Minnesota Copper Pipe n7-218.
Minnesota Indian Life n14-9.
BAERREIS, DAVID A.
Some Comments on Trait Lists and the Hopewellian Culture n30-65.
The Wisconsin Archaeological Survey n29-18.
A Note on a Winnebago Medical Technique n34-139.
Burial Complex of the Reigh Site, Winnebago County, Wisconsin n35-1.
Further Information on the Frost Woods Mound Group n35-43.
Report on the Dietz Site n37-1.

Burial Complex of the Reigh Site, Winnebago County, Wisconsin n38-244.
Aztalan Revisited--An Introduction n39-2.
The Aztalan Lithic Complex n39-5.
Late Woodland Pottery in Wisconsin as seen from Aztalan n39-35.
Domestic Houses at Aztalan n39-62.
Climatic Episodes and the Dating of the Mississippian Cultures n46-203.
Early Salvage Excavations in the Madison Area, Dane County, Wis. n47-101.
BAILEY, W.H.
Potato Lake, Rusk County Mounds o11-93.
BARDEN, JOHN A.
Brule River Copper Sources n9-122
BAREIS, CHARLES J.
Excavation of Two Burials at the Material Service Quarry Site, La Salle County, Illinois n46-140.
BARNOUW, VICTOR
Reminiscenses of a Chippewa Mide Priest n35-83.
A Chippewa Mide Priest's Description of the Medicine Dance n41-77
BARRETT, SAMUEL A.
American Museums Association Meeting, May 17, 1926 n5-88.
The Ancient City of Aztalan o19-7.
Huron Herbert Smith n12-69
The Lapham Research Medal n5-49
Recent Excavations at Aztalan n12-74
BARTON, ALBERT O.
Black Hawk Retreat in Dane County n24-61
Grant County Indian Remains o15-177.
Kumlien Mounds Scene of Kumlien Centennial n24-68.
Taylor County Notes o11-91
Where Wisconsin Names Originated n26-84.
Wisconsin's Charles Brown n25-45.
BASTIAN, TYLER
The Beloit College Mound Group, a Preliminary Report n39-155.
Some Additional Data on the Beloit College Mound Group (Ro 15) n43-57.
BAUCHLE, WILL F.
Archaelogy and Radio n14-18.
BEAN, E.F.
Increase A. Lapham, Geologist n16-79.
BEAUBIEN, PAUL L.
Hopewellian Mounds at Effigy Mound National Monument--Iowa n34-125.
BECKER, R.H.
The Chetek and Rice Lakes o16-83.
Researches in Wood and Portage Counties o11-39.
Turtle Creek Mounds and Village Sites o12-7.
BEHNCKE, NILE JURGEN
How the Stars Were Brought Back to the Valley n19-93.
Legend of Island Park n19-90.
The Oshkosh Public Museum n23-19.
Winnebagoland Legends n20-31.
BELL, EARL H.
Archaeological Research in Wisconsin n12-1.
An Evaluation of Recent Nebraska Finds Sometimes Attributed to the Pleistocene n13-49.
Nebraska Archaeology n13-1.
BENNETT, JOHN W.
A History of Mississippi Cultures n24-33.

BERNSTEEN, KATHRYN
Historic Indian Burials in Oneida County n49-96.
BERNSTEEN, ROBERT
Historic Indian Burials in Oneida County n49-96.
BERRY, J. BREWTON
Archaelogical Activity in Missouri n16-1.
BINFORD, LEWIS R.
An Analysis of Cremations from Three Michigan Sites n44-98.
Radiometric Analysis of Bone Material from the Oconto Site n43-31.
BISCHOFF, ROBERT
The Peyote Cult n29-28.
BLACK, ROBERT
Geology of Raddatz Rockshelter, Sk 5, Wis. n40-60.
BLACKHAWK, JOHN
Indian Folktales n7-223.
Winnebago Indians and the Mounds n8-106.
BLAKE, BRADLEY
The Warnke Mounds in Portage County n37-25
Bigelow-Hamilton Site "I" n37-65.
Portage County Site Report n42-57.
BLAKE, LEONARD W.
Plant Materials from the Bell Site, Wn 9, Wisconsin n44-70.
BLEED, PETER
Notes on Aztalan Shell-Tempered Pottery n51-1.
BOEKELMAN, HENRY J.
Archeo-Conchology in the Union of Soviet Socialistic Republics n18-93.
Archeo-and Ehno-Conchology n17-13.
BOUDEMAN, DONALD O.
Bird-Stone Ceremonial Found on Skull n24-17.
BRANDON, JAY
Excavations at the Lamb-5 Site (47-Sc-25). Saint Croix County, Wis. n49-1.
BRANNON, PETER A.
Urn Burials in Alabama n9-110.
BROSE, DAVID S.
The Backlund Mound Group n49-34
The Goodwin-Gresham Site, 20 IS 8, Iosco County, Michigan n50-125.
BROWN, CHARLES E.
Aboriginal Evidence in Northwest Wisconsin o13-7.
Achen Mound Group n26-40.
Additional Barbed Stone Axes n18-63.
Additional Bird-Stone Ceremonials o8-106.
Additional Information on the Distribution of Discoidals, Cones, Plummets, and Boat Stones in Wisconsin n5-64.
Additional Notes on Vilas and Oneida Counties n3-52.
Additional Stone Spuds n5-79.
Additional Trade Implements o18-16.
Additional Wisconsin Indian Medals o17-22.
Additional Wisconsin Spirit Stones o20-87.
Additions to List of Wisconsin Aboriginal Pottery o4-19.
Additions to the Record of Wisconsin Antiquities II o7-1.
Additions to the Record of Wisconsin Antiquities III o8-113.
Airplane Photograph of an Indian Effigy Mound n6-105.
Algonkian Artifacts o19-25.
The Antiquities of Green Lake o16-1.
Archaeological History of Milwaukee County o15-23.
Archaeological Reconnaissance of Juneau County o17-107.

Awarding the Lapham Medal n14-87.
The Banner Stone Ceremonials of Wisconsin o10-145.
Barbed Stone Axes n9-139.
Beaver Dam Lake n1-7.
Bird-Stone Ceremonials of Wisconsin o8-5.
The Brule-St. Croix Portage Trail n14-34.
Cartographic Symbols for Archaeological Survey Maps n8-129.
Cassville Mounds and Sites o15-193.
Ceremonial Knives o13-176.
The Charles H. Hall Collection n6-59.
Checklist of Wisconsin Indian Implements n8-81.
The Chetek and Rice Lakes o16-83.
Chipped Flint and Quartzite Knives o20-7.
The Collection and Preservation of Local Archaeological Data o2-102.
Copper Adze n23-17.
Copper Bird Effigy Ornament n11-104.
Corner-Tang Flint Artifacts n16-62.
Curve-Tailed Panther Mounds n16-10.
The Dedication of the Fort Atkinson Intaglio o19-197.
Delavan Lake n6-7.
Delavan Lake Mounds n3-132.
The Desired Purchase and Preservation of the Celebrated Man Mound o6-45.
The Distribution of Discoidals, Cones, Plummets and Boat Stones in Wisconsin o8-139.
A Double-Bitted Axe in the W.H. Vogel Collection o1-87.
Effigy Platform Pipe n8-13.
A Field Assembly of the Wisconsin Archaeological Society at Carroll College o6-1.
Field Work in 1939 n20-69.
Fifth Addition to the Record of Wisconsin Antiquities n4-9.
Fire-Steels n10-65.
Flint Scrapers o20-33.
Fluted Copper Spud n21-65.
Fork-Tailed Bird Mounds n15-36.
Fourth Addition to the Record of Wisconsin Antiquities o10-165.
Fox Lake o20-111.
The "Grand Spring" n24-78.
Grant County Indian Remains o15-177.
Grooved Stone Axes o17-1.
A Group of Indian Mounds on the Pecatonica River o9-117.
Halvor Lars Skavlem n19-47.
The Heim Effigy Mound n18-39.
Henry Pierpont Hamilton o18-93.
The Huff Mandan Village Site n9-120.
The Implement Caches of the Wisconsin Indians o6-47.
Indian Caves in Wisconsin n5-7.
Indian Drills and Reamers n24-25.
Indian Fords of the Rock River n15-69.
Indian Gravel Pit Burials in Wisconsin n3-65.
Indian Mounds in Wisconsin State Parks n15-1.
Indian Trade Finger Rings n24-7.
Indian Trade Implements and Ornaments o17-61.
Indian Village and Camp Sites of the Lower Rock River in Wis. n9-7.
Intaglio Mounds of Wisconsin o9-5.
An Interesting Type of Flint Spearpoint n3-95.
Isle Royale National Park n15-12.
The Joint Meeting at Ripon n10-116.

The Joint Meeting of Wisconsin Scientific Societies o7-107.
The Joint State Assembly at Manitowoc and Two Rivers, August 23-24, 1912 o11-61.
A Koshkonong Pilgrimage o15-200.
La Crosse and Monroe County Notes o11-97.
The Lac Court Oreilles Region o14-41.
Lake Geneva and Lake Como n7-129.
Lake Monona n1-119.
Lake Wingra o14-75.
A Large Fluted Stone Axe n21-1.
Little Green Lake n6-120.
Log Building Museums of Wisconsin n24-46.
Louise Phelps Kellogg n23-86.
Marie C. Kohler n24-82.
Monona Mounds n24-78.
Myths, Legends and Superstitions about Copper n20-35.
Native Copper Harpoon Points n7-50.
The Native Copper Implements of Wisconsin o3-49.
The Native Copper Ornaments of Wisconsin o3-101.
1943 Archaeological Findings n25-7.
Notes on the Occurrence and Use of Bone, Shell, Hematite and Lead Implements in Wisconsin o9-11.
Notes on Some Archaeological Features of Eau Claire, Chippewa, Rusk and Dunn Counties o13-60.
Occurrence of Marine Shells on Indian Sites in Wisconsin o12-53.
An Ornamented Stone Axe o9-49.
Orra L. Hollister n23-129.
Other Spirit Springs n7-215.
Petroglyphs at the Mouth of Lemonweir River n17-75.
Pierced Tablets or Gorgets in the W.H. Ellsworth Collection at Milwaukee o1-37.
Pike Lake n6-41.
Pine, Beaver and North Lakes n10-7.
The Pipe of Peace Ceremony Passes n25-97.
Pottery Smoothers n9-171.
The Preservation of Archaeological and Historical Sites in Ohio o19-16.
Preservation of Indian Memorials o20-149.
The Preservation of the Man Mound o7-139.
Publius V. Lawson o20-13.
The Recent Achievements of the Wisconsin Archaeological Society o5-182.
A Record of Wisconsin Antiquities o5-289.
Reuben Gold Thwaites o12-93.
Rock Lake Mound Group n8-35.
Saskatchewan Dust-Bowl Artifacts n19-14
The Silver Anniversary Celebration n5-47
Silver Trade Crosses o9-104
Some Lapham Letters n16-85
Some Little-Known Wisconsin Implements o9-15
Some Village and Camp Sites in Northern Michigan n9-180.
The State Fair Exhibit of the Wisconsin Archaeological Society o5-201.
The State Field Assembly at Madison o9-57.
The State Landmarks Assembly at Prairie du Chien, September 29-30, 1911 o10-105.
Stone Adzes n31-91.
Stone Celts o18-7.
Stone Gouges o20-83.
Stone Pestles and Mortars n3-7.

Stone Spades and Hoes n2-165.
Stone Spud o2-15.
Suggestions in Regard to Archaeological Research in Wisconsin o6-70.
Toothed Shank Copper Spearpoint n18-77.
Triangular Arrowpoints n19-59.
"Turkey-Tail" Points n9-99.
Undescribed Groups of Lake Mendota Mounds o11-7.
The Unveiling of Tablets on the Observatory Hill Mounds o13-90.
The Use of Earthenware Vessels by the Old Northwest Indians n8-69.
Waukesha County, northern townships n2-7.
Waukesha County, southern townships n2-69.
West Point Marker o13-101.
William Ellery Leonard, an Appreciation n25-135.
Winnebago as Builders of Wisconsin Earthworks o10-124.
Wisconsin Catlinite Quarry o13-80.
Wisconsin Garden Beds o8-97.
Wisconsin Indian Medals o13-28.
Wisconsin Landmarks o12-98.
Wisconsin Museums, 1941 n22-45.
Wisconsin Spirit Stones o7-165.

BROWN, DOROTHY MOULDING
Fire Myths and Legends n20-84.
Indian Lover's Leaps in Wisconsin n17-84.
Indian Tree Myths and Legends n19-30.
Indian Winter Legends n22-49.
Legends of Wisconsin Hills n18-17.
Legends of Wisconsin Rocks n19-7.
Legends of Wisconsin Springs n18-79.
Myths and Legends of Wisconsin Waterfalls n18-110.
Rain Legends and Beliefs n24-27.
Water Monsters Inhabited Lakes and Streams of Wisconsin n17-27.
Wisconsin Indian Cave Legends n18-59.
Wisconsin Indian Corn Origin Myths n21-19.

BROWN, LORRAINE C.
The Wisconsin Tercentenary n13-81.

BROWN, TAGGART
Dr. J.J. Davis n17-25.
Wisconsin Indian Land Cessions n16-53.

BROWN, THEODORE T.
An Abraham Lincoln Indian Medal n8-103.
The Dickson Mound Builders' Tomb n8-29.
Indian Village and Camp Sites of the Lower Rock River in Wis. n9-7.
Lake Geneva and Lake Como n7-129.
Lake Monona Wild Life Sanctuary Association Field Meeting n6-110.
Plant Games and Toys of Chippewa Children n9-185.
Sieur Charles de Langlade n11-143.
Some Curious Uses of Indian Mounds n3-98.

BRUDER, EDGAR G.
Mayville Indian Rock Paintings n30-73.
Archaeological Remains in Wyalusing State Park n32-97.
The Springdale Mounds n34-165.
Archeological Remains in Northeastern Dodge County n34-181

Dodge County Effigy Mounds n35-77.
Salvage Operations at the Kolterman Mound Group n36-3.
Prehistoric Earthworks in Devils Lake State Park n36-12.
The Dummond-Schumberg Effigy Mound Group--Dodge Co. n36-57.
The Oak Grove Effigy Mounds--Dodge County n37-75.
Prehistoric Earth Works in Iowa County n37-135.
Prehistoric Earthworks near Montello, Wisconsin n43-108.
Prehistoric Works in Dodge County, Wis., Town of Hubbard n43-107.

BRYSON, REID A.
Climatic Episodes and the Dating of the Mississippian Cultures n46-203.

BUBBERT, WALTER
Black Hawk Trail Study Asked n25-96.
Hoard Mounds Threatened n24-72.
Monona Mound Saved n25-5.
1945 Legislative Session n26-58.
Saving the Lasley Point Mounds n19-42.
Some Indian Myths about Iron n22-9.

BUCK, DEWEY and WILSON, WILLIAM H.
The Hanson Petroglyphs, Vernon County, Wisconsin n41-98.

BUCKSTAFF, RALPH N.
Cache of Ohio Chert Disks n17-43.
Chief Oshkosh Relics n19-69.
Indian Bone Implements in the Oshkosh Public Museum n23-21.
Indian Shell Work in the Oshkosh Museum n23-28.
Painted and Incised Pottery Fragments of the Winnebagos n22-84.
Painted Pottery of the Winnebago Culture n19-1.
Serrated Shells of the Winnebago n20-23.

BUELL, IRA M.
Beloit Mound Groups o18-119.
Wisconsin Cup Stone o12-21.

BULLOCK, HAROLD R.
Kannenberg's Work at the Lasley Point Site n26-50.
Lasley Point Mound Cruising n23-32.
Lasley Point Mound Excavations n23-37.
Lasley Point Mounds n21-29.

BURCAW, ELLIS
Bedora Mound Group of Oconto n32-74.
Killed by an Arrow n38-58.

BURT, MYRA E.
The Buffalo in Wisconsin n16-70.

BUTTLES, LEWIS S.
The Destruction of Mounds in Certain Southern States n13-94.
The Lapham-Wisconsin Centennial n16-30.

CARTER, B.F.
The Weaving Technic of Winnebago Bags n12-33.

CASAGRANDE, JOSEPH B.
John Mink, Ojibwa Informant n36-106.

CHIPMAN, KARYL
Indian Mounds in Wisconsin State Parks n15-1.

CLELAND, CHARLES E.
Three Unusual Copper Implements from Houghton Co., Mich. n50-26.

COCHRAN, CHARLES
A Woodland Site in Canada n43-52.
COLE, H.E.
Adams County o18-43.
Archaeological Researches in the Upper Baraboo Valley o12-41.
Burial of White Feather n5-29.
The Marking of the Lynx Mound at Devils Lake o20-96.
Summary of the Archaeology of Western Sauk County n1-81.
Three Unfinished Pipes n1-57.
COLLIE, GEORGE L.
Aboriginal Discimination in the Selection of Materials for Tools o7-125.
Comparison Between an Aurignacian and a Magdalenian Necklace from the Dordogne District of France n5-58.
The Field of the Small Museum o8-93.
Researches in Wood and Portage Counties o11-39.
COLLINS, NEWELL E.
Perforated Indian Skulls n24-49.
CONRAD, L.A.
A Perforated Shark Tooth from the Ogden-Fettie Site, Fulton Co.,Ill. n45-156.
COOKE, LESLIE L.
What are You Going to do With Your Collection of Relics? n22-59.
CRAUN, VICTOR S.
Big Eagle Cave Mystery n18-55.
CROSBY, HENRY A.
The Triangular Stone Adze o2-91.
CUTLER, HUGH C.
Report on Dietz Site, Dane County, Wis. n37-1.
Plant Materials from the Bell Site, Wn9, Wisconsin n44-70.
DAALMANN, ELMER C.
A Campsite in Cedarburg Township, Ozaukee County n45-175.
DAIFUKU, HIROSHI
Burial Complex of the Reigh Site, Winnebago Co., Wis. n35-1; n38-244.
DELAVAN, WAYNE
Kansas' Archaeological Survey n20-9.
What Will Become of Your Collection? n20-6.
DIDIER, MARY ELLEN
A Distributional Study of the Turkey-Tail Point n48-3.
DIETZ, E.F.
Report on the Dietz Site, Dane County, Wis. n37-1.
Early Man in Wisconsin and Subsoil Archeology n37-33.
DINERSTEIN, JAMES
The Goodwin-Gresham Site, 20 IS 8, Iosco County, Mich. n50-125.
DIXON, GEORGE I.J.
Bigelow-Hamilton Site "I" n37-65.
DOERFLINGER, CHARLES H.
Franco-American Study of a Waning Prehistoric Industry o9-35.
DOUGLASS, JOHN M.
Cultural Changes among the Wisconsin Indian Tribes, during the French Contact Period n30-1.
Fond du Lac County Gravel Pit Burial n28-43.
Prehistoric Tragedy in Grant County n28-45.

Textile Imprints on Wisconsin Indian Pottery n27-71.

DOWNS, N.L.
A Surface Collection of Truncated Barb and Bifurcated Base Projectile Points from Central Illinois n47-203.
DREXEL, LEOPOLD E.
Cassville Mounds and Sites o15-193.
Fox Lake o20-111.
DUCHAINE, WM. J.
Isle Royale National Park n15-12.
ELDER, ROBERT A.
Extension of the Ioway Focus n16-60.
ELLIS, FRANK E.
Indian Cave Habitations at Maquoketa, Iowa n6-61.
ELLIS, H. HOLMES
Caches of Flint Disks in Wisconsin n22-3.
The Lithic Laboratory n20-75.
ERDMAN, WILTON E.
Display Classifications n22-54.
General Aspects of Field Research for Surface Finds n22-27.
Indian Mounds at Horicon and Vicinity n17-55.
Prehistoric Specialization n14-15.
Record Suggestions for the Archaeologist n11-124.
"There Is No Good Indian But a Dead Indian" n14-97.
ERLANDSON, W.J.
Restoration at Aztalan n34-210.
FALGE, LOUIS
Indian Remains in Manitowoc County o14-121.
FARVOUR, FRANKLIN B.
The Radke Area of the Radke-Dunham Site, Winnebago Co. n38-5.
An Effigy Mound at Rush Lake n39-130.
A Segmented, Circular Fire Pit on the Dunham Area of the Radke-Dunham Site (Wn2) n40-121.
FAULKNER, CHARLES H.
The Red Ochre Culture: An Early Burial Complex in Northern Indian n41-35.
The Significance of Some Red Ochre-like Artifacts from Lake County, Indiana n43-1.
The Morrow Site: A Red Ochre Workshop Site in the Kankakee Valley, Indiana n45-151.
FERRY, ROBERT P.
Present Condition of Aztalan n11-108.
FISH, H.C.
A Mandan Village Site o7-122.
FISHER, ALTON K.
The Importance of Skeletal Remains in Wisconsin Archaeology n8-14.
Problems in Physical Anthropology in Wisconsin n19-50.
Rubbish n12-90.
The Vertebral Pathology of Prehistoric Wisconsin Indians n10-105.
FITCH, EDITH MEDBERY
Medicine Rock n18-35.
FITTING, JAMES E.
Ceramic Relationships of Four Late Woodland Sites in Northern Ohio n45-160.

The Goodwin-Gresham Site, 20 IS 8, Iosco County, Mich. n50-125.
The Hi-Lo Site, A Late Paleo-Indian Site in Western Michigan n44-87.
Rim Diameter and Vessel Size in Wayne Ware Vessels n47-208.

FLINT, A.S.
Archaeological Researches in the Upper Baraboo Valley o12-41.
FOGEL, IRA L.
The Dispersal of Copper Artifacts in the Late Archaic Period of Prehistoric North America n44-129.
FOUST, PENNY
Reigh Site Report, No. 3 n37-97.
FOX, GEORGE R.
Additions to the Record of Winnebago County Antiquities n1-61.
The Ancient Copper Workings on Isle Royle o10-73.
Archaeological Researches along the West Shore of Green Bay o11-125.
Effigy Mound Photographs o20-35.
Indian Remains on Washington Island o13-157.
Indian Remains in Waushara County o15-113.
Lake Shawano and the Wolf River o16-57.
"Lost" Effigy Group o13-182.
MacGregor Bay Cemetery n10-61.
Marinette County o17-33.
Outagamie County Antiquities o15-1.
Stoneworks and Garden Beds in Winnebago County n1-47.
The Prehistoric Garden Beds of Wisconsin and Michigan and the Fox Indians n40-1.
FRACHTENBERG, LEO J.
Our Indebtedness to the American Indian o14-64.
FRECKMANN, KERMIT
Additional Pleasant Lake Mounds n15-74.
Charles E. Brown n27-22.
Hagner Indian Mounds n23-1.
Mounds on Pleasant Lake n12-111.
Waubeka Indian Mound Group n28-63.
Joedicke Bird Mounds n36-103.
FREEMAN, JOAN
Late Woodland Pottery in Wisconsin as seen from Aztalan n39-35.
The Millville Site, A Middle Woodland Village in Grant Co., Wis. n50-37.
Price Site III, RI 4, A Burial Ground in Richland Co., Wis. n47-33.
The Wisconsin Field Archaeology Act of 1965 n47-87.
GASTON, EDWARD PAGE
To Check Vandalism in Arizona n14-43.
GEREND, ALPHONSE
Additions to the List of Wisconsin Aboriginal Pottery o4-19.
The Archaeological Features of Sheboygan County o1-61.
Potsherds from Lake Michigan Shore Sites in Wisconsin o4-3.
Sheboygan County o19-121.
GERTH, ARTHUR
Lake Poygan Indians n10-102.
GIBBON, GUY E.
The Midway Village Site: An Orr Phase Oneota Site in the Upper Mississippi River Valley n51-79.

GLASER, J.H.
An Archaeological Reconnaissance in Northeastern Wisconsin o11-107.
GRANT, ROBERT
Evidence of Old Copper Culture in South Dakota n44-97.
GREENWALD, MARTIN
Reigh Site Report No. 3 n37-97.
GREGORY, JOHN GOADBY
Charles Edward Brown, Early Milwaukee Background n25-42.
Museum Origins in Milwaukee n12-54.
GRIFFIN, JAMES B.
Climatic Change--a Contributing Cause of the Growth and Decline of Northern Hopewellian Culture n41-21.
GUENTZEL, RALPH
Large Native Copper Knives n13-32.
GUTH, ALEXANDER CARL
Archaeologist, Antiquarian and Company n18-10.
Historic American Building Survey n18-121.
GUTHE, CARL E.
Archaeological Surveys n11-57.
The Ceramic Repository for the Eastern United States at the University of Michigan under the Auspices of the National Research Council n8-20.
HALL, ROBERT
Discovery of an Indian Rock Shelter in Brown County n25-90.
The Goddard-Ramey Cahokia Flight: A Pioneering Aerial Photographic Survey n49-75.
A Preliminary Report on the Iroquois Aspect in Wisconsin n28-34.
Wax and Fiber Process of Pottery Restoration at the Neville Public Museum n25-16.
Commentary on Carcajou Carbon-14 Dates n39-174.
HALPIN, ROBERT B.
Wood and Juneau County Mound Groups n17-88.
HALSEY, JOHN R.
Rim Diameter and Vessel Size in Wayne Ware Vessels n47-208.
HAMILTON, HENRY P.
Copper Implement o1-55.
HARN, ALAN D.
Surface Collections from Three Sites in the Central Illinois River Valley n47-150.
HARTMAN, LILLIAN D.
Life and Customs of the Navajo Women n18-106.
HARTMAN, ROBERT B.
Alaska Another "Melting Pot" n21-39.
Costumes of the North American Indians n18-1.
Indian Life Today n20-14.
Milwaukee Hobby Show n19-95.
Totem Poles and Totemism n19-17.
HASKINS, STANLEY G.
Remains of Aboriginal Occupation in Pewaukee Township, Waukesha County o8-81.
HAWKINS, LUCY ROGERS
Chippewa Indian Idol n6-83.

HAZLETT, DIANE J.
Additional Petroglyphs at Roche-A-Cri State Park n46-191.
HAZLETT, WAYNE J.
Additional Petroglyphs at Roche-A-Cri State Park n46-191.
History of the Lapham Research Medal n49-99.
Three Lapham Research Medals Awarded n49-102.
HEMINGWAY, ESTHER
Museum Exhibits n25-98.
HENNING, WALTER
Upper Mississippi Pottery from Lake Poygan in Waushara Co. n39-149.
HILGER, SISTER M. INEZ
In the Early Days of Wisconsin--an Amalgamation of Chippewa and European Cultures n16-32.
Naming a Chippewa Indian Child n39-120.
HILL, JASPER
Agriculture, Hunting, Fishing n15-21.
HINSDALE, W.B.
Indian Overland Travelways n9-114.
Perforated Skulls, an Inquiry n14-37.
HOLAND, HJALMAR R.
Identification of Some Outagamie Villages n13-71.
HOLLISTER, ORRA L.
Notes on the Mitchell Park Site n14-21.
HOLSTEN, WALTER
Copper Spearpoint n18-73.
HORTON, RICHARD
An Engraved Marine Shell Gorget in Wisconsin n41-69.
HOTTON, J. SIDNEY
The Educational Objective and Business Side of the Geneva Lake Centennial Celebration n11-55.
HOUGHTON, FREDERICK
A Traveling Anthropological Exhibit for Schools o5-197.
HRUSKA, ROBERT J.
A Socketed Copper Harpoon n37-50.
An Old Copper Culture Ornament? n47-8.
The Riverside Site: A Late Archaic Manifestation in Michigan n48-145.
HULBURT, MILTON F.
Card Index Method for Recording Archeological Surveys n11-68.
Copper Spearpoints from Reedsburg, Wisconsin Dells n13-15.
The Reedsburg Cache n8-18.
Report of Survey Work in Sauk County n11-67.
Some Village and Camp Sites in Northern Michigan n9-180.
HURLEY, WILLIAM M.
Archaeological Research in the Projected Kickapoo Reservoir, Vernon County, Wisconsin n46-1.
Codification of Wisconsin's Archaeological Sites n46-148.
The Recent Aztalan Date n45-139.
INGS, MARVEL Y.
The Geological Museum n20-81.

IVEY, ZIDA C.
Dwight Foster Historical Museum n17-67.

Hoard Mounds Saved n25-4.
The Lawton and Lee Collections of the Fort Atkinson Museum n21-14.
Purchase of Hoard Golf Course Would Preserve Indian Mounds n24-73.
JACOBS, RAY
Battle of Kings Mountain Anniversary Celebration n9-187.
JAMISON, JAMES K.
Red Metal n10-69.
JENKINS, JOHN W.
Madison Chapter Report n34-175.
JENKINS, PAUL B.
American Indian Cross-Bow n8-132.
The Geneva Lake Centennial n11-44.
JENSON, PETER
The J.F. Norman Collection of Copper Artifacts n43-65.
JESKE, JOHN A.
Recent Interesting Finds Near Kingston n1-24.
JIPSON, N.W.
Winnebago Villages and Chieftains of the Lower Rock River Region n2-125.
JOHNSON, THORLEY
The Armstrong Site--An Upper Mississippi Site at Pepin, Wisconsin n30-79.
JOHNSTON, GEORGE
Pipe Stems n1-62.
JONES, ROBERT R.
Archaeological Excavations in Polk, Barron and Rusk Counties n29-1.
JURY, WILFRID
Copper Artifacts from Western Ontario n46-223.
KAHQUADOS, SIMON
The Nation of the Three Fires o18-109.
KANNENBERG, ARTHUR P.
Ancient Winnebago Use of Birds as Food n25-95.
Butte des Morts Explorations, 1935-36 n18-42.
Indian Medals in the Oshkosh Public Museum n16-97.
Indian Spirit Tree and Spring n19-74.
Our Post War Program for Wisconsin Archaeological Parks n25-1.
Spoons and Dippers--Prehistoric Winnebago Culture Pottery n19-21.
An Unusual Ceremonial Stone n23-30.
Winnebago County Indian Earthenware n8-124.
KELLOGG, LOUISE PHELPS
Angel Decorah Dietz o18-103.
The Chicago-Milwaukee-Green Bay Trail n9-103.
The Contemporary Scene in Wisconsin n17-34.
The Fur Trade in Wisconsin o17-55.
Central George Rogers Clark on American Antiquities n7-44.
The Historic Brule n8-10.
The Mission of St. Marc n14-1.
The Stockaded Village n8-61.
KESLIN, RICHARD O.
A Preliminary Report of the Hahn and Horicon Sites, Dodge County, Wisconsin (complete no.) n39-4.
KEYES, CHARLES R.
Grooved Axes of the Keokuk Type n10-129.

Some Methods and Results of the Iowa Archaeological Survey n8-135.
KING, BLANCHE BUSEY
Fluorspar Ornaments in the King Collection n16-25.
KING, FAIN WHITE
Kentucky's Ancient Copper Hoard n18-108.
KNUDSEN, JOHN J.
Archaeological Investigations in Wisconsin in 1935 n16-17.
KOEPPLER, PAUL
Cache of 29 Blanks from Marinette County n42-86.
The Pipe Site n42-174.
Portage Mound Group n45-144.
KOUBA, T.F.
An Indian Figurine n35-49.
KRIBS, WILLIAM
A Stockbridge Indian Tale n7-228.
KRISTENSEN, MARK W.
The Beloit Mound Groups: Fifty Years Later n51-37.
KUHM, HERBERT W.
Aboriginal Skin Dressing n19-76.
Aboriginal Uses of Shell n17-1.
American Indian in Painting and Sculpture n10-99.
American "Indians" by Adoption n26-35.
Archaeological Formulae n15-47.
Art of the American Indian n12-21.
Decorative Uses of Shell n25-112.
Dental Remedies of the Wisconsin Indians n46-177.
Folsum Point Controversy n14-27.
Fraudulent Artifacts n15-53.
The Indians of Virginia n11-91.
Isle Royale National Park n15-12.
Pictographs in the Lakehead Region n42-165.
Indian Place-Names in Wisconsin Vol. 33, No. 1-2.
Uses of Native Herbs by Wisconsin Indians n42-97.
KUHM, JORDYCE A.
Wisconsin Indian Drums and Their Uses n27-81.
LAIDLAW, GEORGE E.
Additional Knobbed Stone Implements o12-96.
Geographical Distribution of Certain Knobbed Stone Implements o12-23.
Ojibwa Myths and Tales n1-28.
LANGE, FREDERICK W.
The Beloit Mound Groups: Fifty Years Later n51-37.
The Bigelow Site (47-Pt-29), Portage County, Wisconsin n50-215.
The Excavation of the State-Line Mound Group (Ro-39), Beloit, Wisconsin n49-109.
LAPHAM, JULIA A.
Dr. Philo Romayne Hoy o1-85.
George P. Delaplaine o2-100.
The History and Work of the Landmarks Committee in Wis. o5-177.
Moses Strong o2-4.
LAPHAM, MARY J.
Dr. Increase A. Lapham o1-32.

LARSON, PETER L.
The Erickson Mound Group n42-88.
LAWSON, PUBLIUS V.
Ancient Cairns and Stone Circles in Winnebago County o2-28.
The Ancient City of Aztalan o19-7.
Clam Eaters and Their Shell Heaps in Winnebago County o2-6.
The Great Serpent Mounds at Menasha o1-35.
A List of the Aboriginal Earthenware in Wisconsin Collections o1-96.
The Occurrence of Obsidian Implements in Wisconsin o2-95.
The Potawatomi o19-41.
Summary of the Archaeology of Winnebago County, Wisconsin o2-40.
The Trade Beads of Wisconsin o7-116.
A Village of Clam Eaters n24-21.
The Winnebago Tribe o6-78.
LEMERE, OLIVER
Winnebago Legends n1-66.
The Young Hunter's Blessing o20-94.
LEWIS, T.M.N.
A Florida Burial Mound n10-123.
Kentucky's "Ancient Buried City" n13-25.
"Old Kentucky" n11-41.
Mound Group Opposite Aztalan n35-37.
LINCK, ROBERT
Discovery of an Indian Rockshelter in Brown County n25-90.
LOCKE, JOHN
Earthwork Antiquities in Wiskonsin Territory n11-20.
LOOKAROUND, PHEBE J.
A Menominee Indian Concept of Conservation n16-105.
Reginald Oshkosh n16-100.
LUCIUS, JOSEPH
The Blue Springs n22-7.
LUNDSTED, JAMES E.
Burial Complex of the Reigh Site, Winnebago County, Wis. n35-1 n38-244.
LUNDSTED, EDWARD
Reigh Site Report, No. 3 n37-97.
MAHER, ROBERT
The Aztalan Lithic Complex n39-5.
The Excavation and Reconstruction of the Southwest Pyramidal Mound at Aztalan n39-77.
Six Mile Creek--A Non-Pottery Site on Lake Mendota n40-19.
The Totten Site--A Possible Non-Pottery Site in Walworth Co. n40-116.
MANSFIELD, HIRAM ELDON
The "Cairn" at Lasley's Point n23-45.
MARSH, MARY E.
Mihi Shrines n17-93.
MARTIN, MARION E.
The Erin Cache n22-5.
MARTIN, PAUL S.
Archaeological Survev of Illinois n6-56.
MASON, CAROL IRWIN
The Age of the Old Copper Culture n42-143.

MASON, CAROL
A Catalogue of Old Copper Artifacts in the Neville Public Museum n48-81.
An Early Woodland Vessel from Wisconsin n45-158.
MASON, CAROL J.
The Oneota Component at the Porte des Morts Site, Door County, Wisconsin n51-191.
MASON, RONALD J.
The Age of the Old Copper Culture n42-143.
A Catalogue of Old Copper Artifacts in the Neville Public Museum n48-81.
Fox Valley Archaeology 1: James Island Site n49-57.
Fox Valley Archaeology 2: Kimberly-Clark Site n49-149.
The North Bay Component at the Porte des Morts Site, Door County, Wisconsin n48-267.
Two Late Paleo-Indian Complexes in Wisconsin n44-199.
MAXWELL, MOREAU S.
A Summary of Illinois Archaeology n28-19.
MAYER, MARTIN T.
Effigy Mound Burial at Big Bend, Waukesha County, Group II n43-42.
MC KERN, WILL C.
Archaeological Field Methods in Wisconsin n6-48.
Aztalan n27-41.
Buffalo Lake Mound Explorations, n6-75.
The George A. West Pipe Monograph n14-31.
Hopewell and Cahokia Cultures in Wisconsin n9-160.
The Hopewellian Peoples n27-1.
The Importance of Pottery in Wisconsin Archaeology n8-26.
The Middle Mississippi Peoples n27-25.
Practical Tips on Collecting and Surveying n30-55.
Recent Side-Lights on Aztalan n22-79.
Trait List of the Effigy Mound Aspect n30-39.
Trait List of the Prehistoric Wisconsin Cultures n26-66.
A Unique Copper Specimen n28-72.
An Unusual Type of Copper Knife n10-111.
The Upper Mississippi Peoples n27-10.
Wisconsin Archaeology in the Light of Recent Finds in Other Areas n20-1.
Ringeisen Collection of Fluted Axes n36-25.
Some Varieties of Grooved Axes in the Woodland Area n37-46.
MC LACHLAN, W.G.
The Lake Kegonsa Region n4-181.
The Mounds of the Lake Waubesa Region o12-107.
MEIER, ROBERT J.
Description of Human Skeletal Material from the Millville Site (47-Gt-53) Grant County, Wisconsin n50-109.
MERBS, CHARLES F.
Effigy Mounds and the Burton Site--A Study in Human Biology n47-131.
Skeletal Material from the Bell Site, Wn9, Wisconsin n44-72.
MERICLE, LON
The Underwater Search for Pyramids in Rock Lake, Jefferson County, Wisconsin n43-70.
MEYER, HEINZ
Reigh Site Report, No. 3 n37-97.

MILLER, TOWNE L.
Explorations of Mounds at Kingston n1-22.
Report of the State Archaeological Survey Commission for Season of 1931 n11-61.
Trempealeau, Vernon and Crawford County Notes o11-86.
MOCHON, MARION J.
History of the Wisconsin Stockbridge Indians n49-81.
MOORE, G.R.
Cache of Copper Chisels n1-21.
MOOREHEAD, WARREN K.
Commercial vs. Scientific Collecting o2-93.
A Forgotten Tree Ring Record n14-45.
The Hopewell People n9-106.
Indian Stone Cutting Tools n6-88.
Preservation of the Cahokia Mounds n1-25.
The Progress of Archaeological Science in Wisconsin o7-109.
MORSE, DAN
1962 Excavations at the Morse Site: A Red Ochre Cemetery in the Illinois Valley n45-79.
MORSE, PHYLLIS
1962 Excavations at the Morse Site: A Red Ochre Cemetery in the Illinois Valley n45-79.
MUELLER, THEODORE
Dr. Francis Huebschmann, Indian Agent n25-20.
The Social Significance of Our Legends and Folklore n25-136.
MUNSON, CHERYL ANN
Preliminary Report on an Early Historic Site, Cook Co., Ill. n50-184.
MUNSON, PATRICK J.
The Arnett Mound, Fulton County, Illinois n46-167.
Preliminary Report on an Early Historic Site, Cook Co., Ill. n50-184.
Surface Collections from Three Sites in the Central Illinois River Valley n47-150.
A Surface Collection of Truncated Barb and Bifurcated Base Projectile Points from Central Illinois n47-203.
NIEHOFF, ARTHUR
Otoliths as Ornaments n33-223.
A Milwaukee County Gravel Pit Burial n34-122.
Excavations at Prawatschke Mounds, Dodge County n37-58.
A Brachycephalic Cranium from Brookfield, Milwaukee Co. n37-73.
A Prawatschke Mound Group, a Woodland Burial Complex n37-87.
A Fluted Hammer n38-41.
A Red Ochre Burial in Ozaukee County n39-115.
Beads from a Red Ochre Burial in Ozaukee County n40-25.
NELSON, ELMER R.
Guide to the Rocks and Minerals Used by Prehistoric Indians in the Wisconsin Area n25-76.
NERO, ROBERT
Primary Flake Implements n29-23.
Surface Indications of a Possible Early Archaic Site in Wis. n36-128.
Report on the Dietz Site, Dane County, Wis. n37-1.
NESBITT, PAUL H.
Black-on-White Pottery from the Mimbres Valley, New Mexico n11-82.

NEUENSCHWANDER, HERBERT E.
Indian Trails and Villages of Dodge County, 1834-1837 n39-127.
NEWMAN, DORIS
Eulrich Garden Beds County Park Project n15-19.
NICHOLS, PHEBE JEWELL
Brief Explanation of "Medicine" n21-35.
NICHOLS, P.G.
Archaeological Remains in Kanabec County, Minnesota n6-64.
OESTREICH, NANCY
Butterflies and the American Indian n24-1.
Cultural Change Among the Wisconsin Winnebago n25-119.
Trends of Change in Patterns of Child Care and Training Among the Wisconsin Winnebago n29-39.
OLIVER, JOHN W.
Wisconsin's War History Commission o17-46.
OLSON, RALPH
Line-Marked Celts n49-176.
OMWAKE, H. GEIGER
Analysis of 19th Century White Kaolin Pipe Fragments from the Mero Site, Door County, Wisconsin n46-125.
OSTBERG, NEIL
Additional Material from the Reigh Site, Winnebago Co. n37-28.
Reigh Site Report No. 3 n37-97.
OTTO, IRAN T.
Exceptional Wisconsin Pot n12-89.
OVERLY, MARY KATHLEEN
Two Lower Eau Claire Lake Mounds n46-221.
OVERTON, GEORGE
An Ancient Village Site in Winnebago County n8-94.
The Hidden Story of the Grand Butte des Morts n11-111.
Indian Laws n24-43.
Old Beach Camp Sites in Winnebago County n10-54.
The Sacred Springs of the Lake Poygan Region n7-211.
Silver Ornaments from Grand Butte n10-91.
Some Odd Indian Tools n12-128.
Trade Goods Grignon-Porlier Post n21-71.
What a Season Brings Forth n11-157.
PALMER, CHARLES
Occurrence of Indian Mounds in Northern Sawyer County n43-25.
Truncated Barb Points from Northeastern Illinois n43-9.
PALMER, HARRIS
Occurrence of Indian Mounds in Northern Sawyer County n43-25.
Truncated Barb Points from Northeastern Illinois n43-9.
PARMALEE, PAUL W.
Animal Remains from the Aztalan Site, Jefferson Co. n41-1.
Animal Remains from the Durst Rockshelter, Sauk Co., Wis. n41-11.
Animal Remains from Raddatz Rockshelter (Sk5) n40-83.
Vertebrate Remains from the Bell Site, Winnebago Co., Wis. n44-58.
PARSONS, LEE A.
Unique Display of Skeleton at Lizard Mound State Park n41-53.
Another Indian Burial from Milwaukee n41-71.

PASCO, GEORGE L.
Copper Discs in Wisconsin n30-51,63.
Explorations in Western Green Lake County n11-100.
Unique Copper Specimen n28-72.
PEET, STEPHEN D.
The Present Condition of Mound Exploration in Wisconsin o1-6.
PERINO, GREGORY
The Glosemeyer Mound Group, Warren Co., Mo. n39-144.
The Kraske Village Site and Mound Group n39-181.
A Review of Calhoun County, Illinois Prehistory n43-44.
PERKINS, EDWARD C.
The Vonburn Mounds Near Prairie du Sac o1-93.
PESKE, G. RICHARD
Oneota Settlement Patterns and Agricultural Patterns in Winnebago County n47-188.
PETERSON, MARTIN Q.
An Analysis of the Skeletal Remains of Price Site, III, RI 4 n47-76.
PHILLIPS, GEORGE BRINTON
Analysis of Ancient Sinhalese Metal n3-133.
A Bronze Mirror from Carthage n5-32.
A Prehistoric Copper Mine n2-151.
PILLAERT, E. ELIZABETH
Faunal Remains from the Millville Site (47-Gt 53), Grant County, Wisconsin n50-93.
The Millville Site, Appendix I, Bone Implements n50-88.
POND, ALONZO W.
The Cave of the Mounds--a Subterranean Museum n21-45.
Cave and Rock Shelters of France n3-14.
Report of Preliminary Survey of Important Archaeological Discovery at Mammoth Cave, Ky. n15-27.
Suggestions on Technique in Archaeology n10-45.
Wisconsin Joins Ranks of Oldest Inhabited Areas in America n17-51.
PORTER, A.H.
Aboriginal Evidences in Washburn County o4-35.
PORTER, JAMES WARREN
Archeological Dating Methods n36-69.
Hixton Silicified Sandstone: A Unique Lithic Material Used by Prehistoric Cultures n42-78.
Petrographic Analysis of Eight Aztalan Celts n39-26.
Thin Section Analysis of Ten Aztalan Sherds n47-12.
PORTER, ROLLAND L.
Aboriginal Evidences in Washburn County o4-35.
The Cutler Mounds at waukesha o1-41.
PORTER, V.C.
Visit to Aztalan in 1838 o19-18.
QUICKERT, CARL
Unique Indian Flint Collection n26-82.
QUIMBY, GEORGE I.
The Age of the Oconto Site n43-16.
An Old Copper Site ? at Port Washington, Wis. n38-1.
An Old Copper Site at Menominee, Michigan n38-37.

Late Archaic Culture and the Algoma Beach in the Lake Michigan Basin n39-175.
Late Period Copper Artifacts in the Upper Great Lakes Region n44-193.
A Northwest Coast Artifact from Northern Wisconsin n49-172.
QUINN, JAMES
Killed by an Arrow n38-58.
READ, WILLIAM F.
High Cliff Mounds n28-1
REAGAN, ALBERT B.
Ancient Cities of Northeastern Arizona n9-188.
Ancient Utah People Seem to Have Believed that Snakes Evolved from an Animal n15-44.
Archaeological Finds in the Uintah Basin in Utah n11-162.
Archaeological Notes on the Brush Creek Region, Northeastern Utah n10-132; n15-23.
The Bear Dance of the Ouray Utes n9-148.
The Bois Fort Chippewa n3-101.
Indian Folktales n7-227.
Mounds, etc., in the Nett Lake-Rainy Lake Country of Minn. n7-221.
Picture Writings of the Chippewa Indians n6-80.
Plants Used by the Bois Fort Chippewa (Ojibwa) Indians of Minn. n7-230.
Plants Used by the White Mountain Apache Indians of Arizona n8-143.
Rainy Lakes Indians n2-140.
The Society of Dreamers and the O-Ge-Che-Dah, or Head-Men Dance of the Bois Fort (Ojibwa) Indians of Nett Lake, Minn. n13-35.
RED CLOUD, MITCHELL
Chief Blackhawk n26-80.
REISINGER, M.E.
The Serpent Effigy on Medicine Butte n14-23.
RENAULT, DORIS
Bogus Indian Relics n16-7.
RICE, MARY A.
An Outdoor Museum, Clintonville n26-28.
RINGEISEN, JOS. (JR.)
Birdstones of North America n11-33.
Broken Perforations on Birdstones n30-53.
RITZENTHALER, ROBERT
Chippewa Indian Method of Securing and Tanning Deerskin n28-6.
Copper Discs in Wisconsin n30-51, 63.
Evidence of the Ancestors of the Chiwere Sioux on the Outskirts of Milwaukee n27-89.
Guide to the Rocks and Minerals Used by Prehistoric Indians in the Wisconsin Area n25-76.
The Hopewellian Peoples n27-1.
The Impact of War on an Indian Community n25-10.
Juneau County Petroglyphs n28-51.
Middle Mississippi Peoples n27-25.
Osceoloa Site--an "Old Copper" Site Near Potosi, Wisconsin n27-53.
Tie-ups Between Prehistoric Cultures and Historic Indians Tribes in Wisconsin n30-36.
Trait List of the Effigy Mound Aspect n30-39.
Trait List of the Prehistoric Wisconsin Cultures n26-66.

The Upper Mississippi Peoples n27-10.
Vilas County Serpent Mound n28-54.
Wisconsin Petroglyphs and Pictographs n31-83.
The Menominee Indian Sawmill n32-39.
The Wisconsin Oneida Wake n22-1.
The Oconto Site--An Old Copper Manifestation n33-199.
Copper Pendants--Similarity Between Copper Pendants from Wisconsin and Georgia n33-225.
Buffalo County Petroglyph n34-207.
Woodland Pot from Dodge County n35-54.
Indians in an Urban Situation n36-147.
Some Varieties of Grooved Axes in the Woodland Area n37-46.
Reigh Site Report, No. 3 n37-97.
Old Copper Culture of Wisconsin (complete issue) n38-No. 4.
The Osceola Site--An Old Copper Site Near Potosi, Wis. n38-186.
The Oconto Site--An Old Copper Manifestation n38-222.
Old Copper Complex--An Archaic Manifestation n38-311.
A Red Ochre Burial in Ozaukee County n39-115.
Upper Mississippi Pottery from Lake Poygan, Waushara Co. n39-149.
Old Copper Specimens from Upper Michigan n39-151.
Some Carbon-14 Dates for Wisconsin Old Copper Culture n35-81; n39-173.
Possible Evidence of a Mat-Wrapped Burial in Wisconsin n39-180.
An "Old Copper" Crescent from Alberta, Canada n41-34.
Radio Carbon Dates for Wisconsin n41-65.
A Notched Hoe from Wisconsin n42-77.
Truncated-Barb Points from Dodge County n42-90.
Radio Carbon Dates for Aztalan n42-139.
More Truncated-Barb Points from Wisconsin n42-155.
Another Radiocarbon Date for Aztalan n44-180.
A Copper Ingot? n44-215.
The Riddle of the Spencer Lake Horse Skull n45-115.
A Red Ochre Site in Fond du Lac County n46-143.
Trail Marker Trees n46-183.
A Wisconsin Anchor Stone? n47-10.
The Kouba Site: Paleo-Indians in Wisconsin n47-171.
Radiocarbon Dates for Clam River Focus n47-219.
An Unusual Old Copper Point n48-1.
A Cache of Paleo-Indian Gravers from the Kouba Site n48-261.
An Old Copper Point from Southeastern Iowa n50-33.
The Theory of the Birdstone as an Atlatl Handle Grip, Revisited n51-31.
Clovis and Sandia-Like Points from Dane County, Wisconsin n51-35.
Another Radiocarbon Date for the Oconto Site n51-77.

ROBINSON, C.H.
Banner or Ceremonial Stones o7-134.

ROGERS, MALCOLM J.
Prehistoric Turquois Mines n8-100.

ROHRL, VIVIAN J.
A Chippewa Funeral n48-137.
The Drum Societies in a Southwestern Chippewa Community n49-131.

ROWE, CHANDLER W.
Report on Heller Mound Group n34-144.

The Use of Earth Moving Machinery at Aztalan n36-63.
Testing Operations at the Ox-Bow Site n37-131.
A Crematorium at Aztalan n39-101.
Comments on Old Copper Crania n43-13.
RUEPING, HENRY J.
Fond du Lac Indian Memories n25-126.
Fond du Lac Gravel Pit Burial n25-13.
A Platform Pipe n26-44.
RUST, WILLIAM C.
Eccentric Flints n21-3.
RUYLE, JOHN B.
McKern Greeting n25-22.
SALZER, ROBERT J.
A Fluted Point from Jefferson County n42-133.
SANDER, PHIL
The Hastings Campsite, Kenosha County, Wisconsin n42-157.
A "Trail Marker Tree" at Twin Lakes n46-189.
SANFORD, ALBERT H.
Comments on the Discoidal n12-86.
Disk Pipe o13-103.
The Exploration of Mounds in White's Group in Vernon County o12-30.
Non-Professional Archaeologist n10-139.
A Pot from Panama n13-98.
SCHACHT, ROBERT M.
An Analysis of the Skeletal Remains of Price Site III, RI 4 n47-76.
SCHOEWE, CHARLES G.
Dedicating the Wapuka Site n14-89.
Uses of Wood and Bark Among the Wisconsin Indians n11-148.
A Wisconsin Bird-Stone n10-114.
SCHOEWE, W.H.
Geology of Artifacts n25-89.
SCHUG, ERNEST
Reigh Site Report, No. 3 n37-97.
SCHUMACHER, J.P.
Aboriginal Remains of the Upper Wisconsin Valley o12-75.
An Archaeological Reconnaissance in Northeastern Wisconsin o11-107.
Indian Remains in Door County o16-125.
Survey of Some Antiquities in Portage County o12-87.
SCRIBNER, PATRICIA
Bigelow-Hamilton Site "I" n37-65.
SELLERS, MARY
Indians in an Urban Situation n36-147.
SHEPARD, DANIEL
Indian Folktales n7-226.
SHETRONE, HENRY CLYDE
The Mound-Builders n10-80.
SHUTTLEWORTH, RUTH J.
New Wisconsin Museums n19-25.
The Restoration of an Effigy Mound n13-84.
SILVERBERG, JAMES
The Kickapoo Indians–First 100 Years of White Contact in Wis. n38-61.

SKAVLEM, HALVOR L.
The Archaeology of the Lake Koshkonong Region o7-47.
Indian Hill Mounds o13-93.
Indian Implement Manufacture n9-177.
Notes on Some Archaeological Features of Eau Claire, Chippewa, Rusk and Dunn Counties o13-60.
Popplow Cache o13-105.
SKINNER, ALANSON
Collecting Among the Menomini n3-135.
John Valentine Satterlee o19-209.
Recent Mound Explorations in Shawano County o18-105.
Recollections of an Ethnologist Among the Menomini Indians o20-41.
Sauk War Bundles n2-148.
Some Menomini Indian Place Names in Wisconsin o18-97.
A Trip to the Potowatomi n3-143.
SMITH, EDSON
Suggestions of Mexico in the Mound Relics o8-65.
SMITH, FRANK R.
Notes of the Four Lakes Indians o9-115.
SMITH, HARLAN I.
Andrew Ellicot Douglass o1-42.
Anthropology at Pittsburgh o1-100.
Archaeological Materials from Wisconsin in the American Museum of Natural History o6-20.
Archaeological Work in Wyoming o7-119.
Methods of Collecting Anthropologic Material o1-89.
SMITH, LINCOLN
Effigy Mounds in Richland County n34-168.
SMYTHE, H.A.
Adams County o18-43.
SNYDER, ROBERT
Cache of 29 Blanks from Marinette County n42-86.
SOHRWEIDE, ANTON W.
A New Problematical Artifact n14-39.
The Origin and Distribution of Copper Artifacts n11-153.
The Watertown Village Site n5-51.
Wisconsin Shell Beads n8-32.
SOMERS, A.N.
Prehistoric Cannibalism in America o19-20.
SPAULDING, ALBERT C.
Eskimo at the Reigh Site n38-30.
SPECTOR, JANET DORIS
Seed Analysis in Archaeology n51-163.
SPERKA, ROGER
The Senator Lake Site n43-94.
SPISS, PLUMA B.
Old Copper Artifacts from North Dakota n49-125.
SQUIER, GEORGE H.
Archaeological Resources of Western Wisconsin o13-121.
Certain Archaeological Features of Western Wisconsin o4-25.

STARR, FREDERICK
Crude Stone Implements from the Congo Free State o7-11.
STATE HISTORICAL SOCIETY OF WISCONSIN
The Frederick S. Perkins Collection n49-127.
STEINBRING, JOHN H.
The Radke Area of the Radke-Dunham Site, Winnebago County n38-5.
An Effigy Mound at Rush Lake n39-130.
A Segmented, Circular Fire Pit on the Dunham Area of the Radke-Dunham Site (Wn 2) n40-121.
A Copper "Gaff Hook" from Ontario n48-345.
A Scottsbluff Projectile Point from Manitoba n47-1.
STERLING, WILLIAM T.
A Visit to Aztalan in 1838 o19-18.
STEWARD, JULIAN H.
Petroglyphs and Pictographs n9-123.
STEWART, MARY E.
Sponge Divers Ceremony n7-117.
STOCK, MARK
A Fluted Point from Jefferson County n42-133.
STOLTMAN, JAMES B.
A Preliminary Study of Wisconsin Fluted Points n50-189.
STOUT, A.B.
The Archaeology of the Lake Koshkonong Region o7-47.
Summary of the Archaeology of Eastern Sauk County o5-230.
The Winnebago and the Mounds o9-101.
STOWE, GERALD C.
Archaeological History of Douglas County, Wisconsin n23-89.
Butte des Morts Explorations 1935-36 n18-42.
An Enigmatic Copper Artifact n19-37.
Plants Used by the Chippewa n21-8.
Stone Disc n17-9.
STRUEVER, STUART
Pioneer Archaeology in an Illinois Middle Woodland Mound n51-49.
STURTEVANT, GENE
Dream Dance Drum n13-86.
SUGDEN, EARL
Folsomoid Points in Richland County n35-79.
TAGATZ, E.C.
Indian Remains in Waushara County o15-113.
TAYLOR, RICHARD C.
Notes Respecting Certain Indian Mounds and Earthworks, in the Form of Animal Effigies, Chiefly in the Wisconsin Territory, U.S. n11-1.
TAYLOR, VICTOR S.
Superstitions and their Derivations n17-62.
THOMSON, M.S.
Two Bone Implements from Sheboygan n10-121.
An Unusual Spirit Stone n13-18.
THORNE, G.M.
Illinois State Aracheological Society n17-90.

THRUSTON, G.P.
Tennessee Archaeology at St. Louis--The Thruston Exhibit o3-133.
TITTERINGTON, P.F.
Cahokia Mound Group and its Surface Material n13-7.
TITUS, WILLIAM A.
Aboriginal Remains of the Upper Wisconsin Valley o12-75.
The Cliff Ruins of the Southwest n3-82.
A Copper Banner Stone o15-198.
The Fond du Lac Cache of Copper Implements o13-97.
Fond du Lac County Antiquities o14-1.
Survey of Some Antiquities in Portage County o12-87.
TOMLINSON, FRANKLIN
Indian Mounds and Village Sites at Plum City n4-153.
Pierce County Trails n6-53.
TURNEY, PAUL A.
A Panther Mound at Quinney, Calumet County n44-212.
TUTTLE, RALPH
Prehistoric Earthworks in Devils Lake State Park n36-12.
VANDENBURGH, MARY M.
Arts and Crafts of the American Indian n24-54.
Milwaukee's Midsummer Festival Indian Village, 1941 n22-15.
VAN ROYEN, WILLIAM
An Evaluation of Recent Nebraska Finds Sometimes Attributed to the Pleistocene n13-49.
VANSTONE, JAMES W.
Canadian Trade Silver from Indian Graves in Northern Illinois n51-21.
VICKERY, KENT D.
Evidence Supporting the Theory of Climatic Change and the Decline of Hopewell n51-57.
WALLACE, BEN J.
The Oklahoma Kickapoo: An Ethnographic Reconstruction n45-1.
WATERS, LOUISE N.
Kettle Moraine State Forest n19-4.
WATKINS, MARTHA B.
Indi-Eiken n19-56.
WEBB, CLARENCE H.
The Role of the Non-Professional in the Local Society n37-82.
WELLS, EDWARD W.
Additional Finds from Heins Creek n50-1.
WELLS, MRS. EDWARD
Another Toggle Head Harpoon from Door County n45-99.
Mesh Spreader with Upper Mississippi Cultural Affiliations n45-101.
WENZ, ARTHUR
The Marking of the State Fair Park Mounds o9-79.
WEST, GEORGE A.
The Aboriginal Pipes of Wisconsin o4-47.
The Antiquities of Egypt n7-7.
Chipped Flint Perforators of Wisconsin o8-37.
A Distinguished Member of the Wisconsin Archaeological Society, Dr. George Lucius Collie n11-77.
Fraudulent Aboriginal Pipes n15-49.

The Greater Copper Pike n12-31.
The Indian Authorship of Wisconsin Antiquities o6-169.
Pebble Net-Weights o7-131.
Pipestone Quarries in Barron County o9-31.
Platform Pipes from a Mound in Vernon County o7-34.
The Story of Aztalan n8-51.
Summary of the Archaeology of Racine County, Wisconsin o3-6.
Superimposed Aboriginal Implement n10-89.
Unusual Banner Stones n17-32.
Uses of Tobacco and the Calumet by Wisconsin Indians o10-5.
The Way to Get the Most out of Archaeology n14-91.

WHALEY, KIRK
Reigh Site Report, No. 3 n37-97.

WHEATON, HARRIET
The Dedication of the Fort Atkinson Intaglio o19-197.

WHITE, W.B.
Eighty Years After Lapham n12-48.
Report on the Outlet Site on Lake Monona n30-22.

WHITNEY, LEE R.
Archaeological Literature of Interest and Value to the Wis. Student o5-221.

WIEGAND, PHILLIP H.
A Native Copper Harpoon Point n36-22.
A Plea From Your President n40-268.

WIGHT, LOYAL O.
A Large Stone Pestle n15-41.

WILL, GEORGE H.
Progress in North Dakota n20-77.

WILMSEN, EDWIN N.
Three Unusual Copper Implements from Houghton County, Mich. n50-26.

WILSON, JOHN P.
Local Historical Sources in Illinois and Their Value to Anthropologists n48-129.

WILSON, WILLIAM H. (with Dewey Buck)
The Hanson Petroglyphs, Vernon County n41-98.

WINCHELL, NEWTON H.
Habitations of the Sioux in Minnesota o7-155.

WINN, VETAL
A Cache of Copper Chisels n3-51.
Family Names of Civilized Indians n8-36.
Indian Mounds State Fair Park n22-19.
The Minocqua Lake Region n3-41.
Ornamented Copper of the Wisconsin Area n23-49.
Two Fluted Stone Implements n7-219.
Unusual Varieties of Common Types of Indian Implements n27-91, n28-14, 38, 57, 76.

WISSLER, CLARK
Archaeology as a Human Interest n8-119.

WITTRY, WARREN
Discovery of an Indian Rock Shelter in Brown County n25-90.
The Oconto Site--An Old Copper Manifestation n33-199.
A Unique Ceramic Effigy n35-53.

Salvage Operations at the Kolterman Mound Group n36-3.
Mendota Hills Bird Effigy Mound, Dane County n36-53.
Reigh Site Report, No. 3 n37-97.
Kolterman Mound 18 Radiocarbon Date n37-133.
Prehistoric Earthworks in Iowa County n37-135.
Preliminary Study of the Old Copper Complex n38-204.
The Oconto Site--An Old Copper Manifestation n38-222.
Old Copper Complex--An Archaic Manifestation n38-311.
Domestic Houses at Aztalan n39-62.
The Raddatz Rockshelter, Sk5, Wis. n40-33.
The Wakanda Park Mound Group, Dn1, Menomonie, Wis. n40-95.
Archeological Studies of Four Wisconsin Rockshelters n40-137.
A Raven Headdress from Sauk County, Wisconsin n43-87.
The Bell Site, Wn9, An Early Historic Fox Village n44-1.

WOJTA, J.F.
Visit to the Indian Sugar-Bush Ceremonials n11-172.
Wisconsin Indians in Farming n6-115.
Wisconsin Indians Learn Farming o18-19.

WOLFF, ELDON G.
Pottery Restoration n38-43.

WORKMAN, KAREN
A Preliminary Study of Wisconsin Fluted Points n50-189.

WORMINGTON, H.M.
An Investigation of Possible Connections between the Early Metal Using Cultures of Siberia and the Old Copper Culture n43-20.

WORTH, P.L.
New York Stone Pestles n10-74.

WRIGHT, HENRY T.
The Goodwin-Gresham Site, 20 IS 8, Iosco County, Michigan n50-125.

YARNELL, RICHARD A.
Archaeological Plant Food Remains from Wisconsin n47-196.

YOHN, MADGE
Indian Earthworks of the Four Lakes Region n18-14.

YOUNGER, HARVEY O.
Archaeological Researches Along the West Shore of Green Bay o11-125.
Lake Shawano and the Wolf River o16-57.
Marinette County o17-33.

ZANDER, HERMAN
Fiftieth Anniversary Banquet n34-179.

PART II
SUBJECT INDEX

Adams County o18-43.
Adze, copper n23-17.
  Stone n13-91.
  Cache, Indian n19-112.
  Triangular o2-91.
Aerial Photography
  Goddard-Ramey Cahokia Flight n49-75.
Agriculture, hunting, fishing n15-21.
Alabama, urn burials n9-110.
Alaska, "Melting Pot" n21-39.
Algonkian artifacts o19-25.
American Anthropological Association
  Central section organized n1-58.
  Meeting, 1901 o1-100.
  1925 n4-159.
  1926 n5-75.
  1927 n6-85.
  1930 n9-152.
American Historical Association, endowment n5-90.
American Museums Association meeting, 1926 n5-88.
Anchor Stone, Wisconsin? n47-10.
Anthropological exhibit, traveling, schools o5-197.
Anthropology, Pittsburgh o1-100.
  Physical, problems n19-50.
  Value of local historical sources in Illinois n48-129.
Archaic Period
  Dispersal of copper artifacts n44-129.
  Riverside site, Michigan n48-145.
Archaic Site
  Possible Early Archaic Site in Wisconsin n36-128.
Archeological Notes n33-229.
  Dating Methods n36-69.
Archaeological research in the projected Kickapoo Reservoir, Vernon Co. n46-1.
Archaeology, bills o10-65.
  Classifications
    Card index n11-68.
    Display n22-54.
    Record suggestions n11-124.
  Field methods n6-48; n22-27.
  Formulae n15-47.
  Human interest n8-119.
  Literature for student o5-221.
  Radio n14-18.
  Relation to history o9-93.
  Seed analysis technique n51-163.
  Technique, suggestions n10-45.
  Way to get most from n14-91.

Archaeologist, antiquarian & company n18-10.
Non professional n10-139.
Arizona, ancient cities of northeastern n9-188.
Plants used by White Mt. Apache Indians in n8-143.
Armstrong site, upper Mississippi site, Pepin, Wisconsin n30-79.
Arnett Mound, Fulton County, Illinois n46-167.
Arrowhead see Point
Art, American Indian n12-21; n24-54.
American Indian in painting and sculpture n10-99.
Artifacts, Algonkian o19-25.
Copper n11-153; n16-31; n19-37.
Copper, J.F. Norman collection n43-65.
Corner-tang flint n16-62.
Fraudulent n15-53.
Geology of n25-89.
Literature on Wisconsin n17-20.
Northwest Coast artifact from Northern Wisconsin n49-172.
Problematical n14-39.
Saskatchewan dust-bowl n19-14.
Significance of some red ochre-like artifacts from Lake Co., Ind. n43-1.
Surface collections from three sites in the central Illinois River valley n47-150.
Atlatls
Birdstone as a handgrip n51-31.
Axe, double-bitted o1-87.
Grooved n10-129.
Stone, barbed n9-139; n18-63.
Fluted o1-13; n18-75; n21-1.
Grooved o17-1.
Ornamental o9-49.
Grooved axes, varieties of n37-46.
Fluted axes, Ringeisen Collection n36-25.
Aztalan o19-7; n8-51; n11-108; n22-79; n27-41.
Conveyed to park system n1-25.
Ownership deed n26-43.
Recent excavations n12-74.
Visit to o18-152; o19-18.
Restoration n34-210.
Mound group opposite Aztalan n35-37.
Use of earth moving machinery at Aztalan n36-63.
Exploration and reconstruction (Vol. 39, No. 1, complete issue)
Aztalan revisited: an introduction n39-2.
Aztalan lithic complex n39-5.
Petrographic analysis of eight Aztalan celts n39-26.
Late Woodland pottery as seen from Aztalan n39-35.
Domestic houses at Aztalan n39-62.
Excavation and reconstruction of the southwest pyramidal mound at Aztalan n39-77.
A crematorium at Aztalan n39-101.
Animal remains from the Aztalan site n41-1.
Radio-carbon dates for Aztalan n42-139; n44-180; n45-139; n46-203.
Thin section analysis of sherds n47-12.

Shell-tempered pottery n51-1.
Balls, stone n4-163.
Banner-stones o7-134; n17-32; n20-65.
Ceremonials o10-145.
Copper o15-198.
Minnesota n5-62.
Banquet, Fiftieth Anniversary n34-179.
Baraboo, Valley, archaeological research in Upper o12-41.
Barrett, Samuel A. n20-43.
Barron County n29-1.
Beads, trade, of Wisconsin o7-116.
Wisconsin Shell n8-32.
Bell Site n44-1.
Plant materials n44-70.
Skeletal material n44-72.
Vertebrate remains n44-58.
Beloit College mound group
A preliminary report n39-155.
Bigelow site, Portage County n50-215.
Bigelow-Hamilton Site "I" n37-65.
Bird Mounds
Joedicke n36-103.
Bird-stone n10-114; n11-33; n30-53.
Ceremonials o8-5; o8-106; n24-17.
Birdstones as atlatl handgrip n51-31.
Black Hawk n26-80.
Retreat in Dane County n24-61.
Blanks
Cache of chert blanks n42-86.
Boat-stone, distribution of discoidals, cones, plummets, in Wis. o8-139; n5-64.
Brown, Charles E. n25-42, 45, 55; n27-22.
Brown County, Indian rock shelter n25-90.
Brule, historic n8-10.
Copper sources n9-122.
Buffalo in Wisconsin n16-70.
Buffalo County
Petroglyphs n34-207.
Buffalo Society of Natural Sciences, traveling anthropological exhibit for schools o5-197.
Burials, gravel pit n3-65.
Fond du Lac Co. n25-13; n28-43.
Red paint n21-74.
Urn, Alabama n9-110.
Mat-wrapped: possible evidence of n39-180.
Another Indian burial from Wisconsin n41-71.
Milwaukee County gravel pit burial n34-122.
Dane County, early salvage excavations in Madison area n47-101.
Historic Indian burials, Oneida County n49-96.
Material Service Quarry Site, Illinois n46-140.
Price Site III, RI 4, Richland County n47-33; n47-76.
Burton Site, Dane County n47-101; n47-131.
Butte des Mortes, explorations, 1935-36 n18-42.

Hidden story of n11-111.
Silver ornaments from n10-91.
Cache, adze, stone, Indian n19-112.
Chert blanks n42-86.
Copper chisels n1-21; n3-51.
Implements n21-34.
Fond du Lac o13-97.
Chert, Ohio n17-45.
Implements, Wisconsin o6-47.
Erin n22-5.
Implement o6-47.
Popplow o13-105.
Reedsburg n8-18.
Tichigan n21-69.
Cahokia culture, Hopewell, Wisconsin n9-160.
Cahokia Site
Goddard-Ramey aerial photographic survey n49-75.
Cairns, Lasley's Point n23-45.
Winnebago Co. o2-28.
Calhoun County, Illinois A review of prehistory n43-44.
California Pacific International Exposition, American Indian n15-82.
Calumet County, Panther Mound at Quinney n44-212.
Cannibalism in America o19-20.
Carbon - 14 Dates
Archaic period copper sites n44-129.
Aztalan n42-139; n44-180; n45-139.
Aztalan and Oneota sites n46-203.
Beloit College Mound Group n43-57.
Clam River Focus n47-219.
Age of the Old Copper Culture n42-143.
Caracajou site n39-174.
For Old Copper n35-81; n39-173.
Kolterman Mound 18, Carbon 14 Dates n37-133.
Oconto site n51-77.
Cassville site o15-193.
Catawba n5-93.
Cave dwellers, west Texas n18-25.
Caves, Big Eagles, mystery n18-55.
Cave of Mounds n21-45.
France n3-14.
Indian, Maquoketa, Iowa n6-61.
Wisconsin n5-7.
Mammoth, Kentucky n15-27.
Minn. and Iowa n5-24.
Celts, fluted handled n9-150.
Line-marked celts n49-176.
Stone o18-7.
Ceremonial stones, banner o7-134; o10-145.
Bird-stone o8-5; o8-106; n24-17.
Unusual n23-30.
Champlain Valley Archaeological Society n18-32.

Chippewa, amalgamation of cultures n16-32.
Bois Fort n3-101.
Chippewa Funeral n48-137.
Drum Societies n49-131.
Head-men dance n13-35.
Idol n6-83.
Picture writing n6-80.
Plant games n9-185.
Plants used n7-230; n21-8.
Tanning deerskin n28-6.
Mide Priest, reminiscenses of n35-83.
Mide Priest's description of the medicine dance n41-77.
Chippewa County o13-60.
Chisels, cache of copper n1-21; n3-51.
Clam eaters and shell heaps, Winnebago Co. o2-6.
Village of n24-21.
Clam River Focus, radiocarbon dates n47-219.
Clark, Gen. Geo. Rogers, on American Antiquities n7-44.
Clarke, Willis P. n5-90.
Cliff ruins, southwest n3-82.
Codification, Wisconsin's archaeological sites n46-148.
Cole, Harry E. n8-7.
Collecting, commercial vs. scientific o2-93.
Methods, anthropologic material o1-89.
Preservation, local archaeological data o2-102.
Tips on, surveying n30-55.
Collections, copper implements, MPM o1-11.
Wisconsin o20-27.
Ellsworth, pierced gorgets o1-37.
Frederick S. Perkins Collection n49-127.
Hall, Charles H. n6-59.
Indian flint n26-82.
J.F. Norman Collection of copper artifacts n43-65.
King, fluorspar ornaments n16-25.
Lawton and Lee, Ft. Atkinson Museum n21-14.
Old Copper artifacts in Neville Public Museum n48-81.
Thruston o3-133.
Vogel, W.H., double-bitted axe o1-87.
West, aboriginal pipes o12-64.
What are you going to do with your, of relics n22-59.
What will become of your n20-6.
Collie, Geo. Lucius n11-77.
Colombian city, prehistoric n3- 21.
Committee for codefying types of archaeological sites in Wis., report n24-10.
Conchology, Archeo-, in the Union of Soviet Socialist Republics n18-93.
Archeo- and Ethno- n17-13.
Cones, distribution in Wisconsin o18-139; n5-64.
Copper, adze n23-17.
Artifacts n11-153; n16-31; n19-37.
Artifacts from Western Ontario n46-223.
Banner stone o15-198.
Brule River sources n9-122.

Chisels, cache n1-21; n3-51.
Collection o20-27.
Discs n30-51, 63.
"Gaff Hook" from Ontario n48-345.
Harpoon points n7-50.
Implements o1-55; o3-49; n2-178; n10-72.
Cache n21-34.
Fond du Lac o13-97.
MPM collection o1-11.
Wis. collection o20-27.
Ingot? n44-215.
Isle Royale, workings o10-73.
Kentucky's ancient hoard n18-108.
Knives n9-145; n10-111; n19-16.
Mine, prehistoric n2-151.
Myths n20-35.
Ornamented n23-35.
Ornaments o3-101.
Bird effigy n11-104.
Osceola site n27-53.
Pike n5-66; n12-31.
Pipe, Minn. n7-218.
Spearpoints n18-73.
Reedsburg n13-15.
Toothed shank n18-77.
Spud, fluted n21-65.
Unique n28-72.
Copper
Oconto site n33-199; n38-222.
Carbon -14 dates for old copper n35-81.
Pendants--Similarities between pendants from Wis. and Georgia n35-225.
Burial complex of the Reigh Site, Winnebago Co.
(See Reigh Site) n35-1.
Native copper harpoon point n36-22.
Socketed copper harpoon n37-50.
Additional material from the Reigh Site, Winnebago Co. n37-28.
An Old Copper Site ? at Port Washington n38-1.
Reigh site report, No. 3 n37-97.
Six Old Copper implements from Long Lake, Florence Co. n38-35.
Old Copper site at Menominee, Michigan n38-37.
Preliminary study of the Old Copper complex n38-204.
Old Copper Complex--an archaic manifestation n38-311.
Old Copper culture of Wisconsin (Complete Issue) V38, No. 4.
Old Copper Specimens from Upper Michigan n39-151.
Carbon 14 dates for Wisconsin Old Copper culture n39-173.
"Old Copper" crescent from Alberta, Canada n41-34.
Age of the Old Copper Culture n42-143.
Comments on Old Copper Crania n43-13.
Oconto Site--the age of the Oconto site n43-16.
An investigation of possible connections between the early metal using cultures of Siberia and the Old Copper Culture n43-20.

Oconto site--radiometric analysis of bone material n43-31.
J.F. Norman Collection of Copper Artifacts n43-65.
Old Copper Culture in South Dakota n44-97.
Dispersal of copper artifacts in the Late Archaic period n44-129.
Late period copper artifacts in upper Great Lakes region n44-193.
Old Copper Culture Ornament? n47-8.
Unusual Old Copper point n48-1.
Old Copper artifacts in the Neville Public Museum n48-81.
Old Copper artifacts from North Dakota n49-125.
Houghton County, Michigan, three unusual copper implements n50-26.
Old Copper point from southeastern Iowa n50-33.
Crawford County o11-86.
Cremation, analysis from three Michigan sites n44-98.
Cross, large silver n17-79.
Silver trade n9-104.
Cross-bow, American Indian n8-132.
Cup stone, Wisconsin o12-21.
Dakota, cloth weaving n3-22.
Dance, bear, Ouray Utes n9-148.
Head-men, Bois Fort Chippewa of Nett Lake, Minn. n13-35.
Dane County, Wis.
Airport village site n34-149.
Clovis and Sandia-like points n51-35.
Early salvage excavations in the Madison area n47-101.
Mendota Hills bird effigy mound n36-53.
Report on Dietz site n37-1.
Davis, J.J. n17-25.
Delaplaine, George P. o2-100.
Devils Lake State Park
Prehistoric earthworks n36-12.
Dickman Site, a campsite in Cedarburg Township n45-175.
Dietz, Angel Decorah o18-103.
Dietz Site n37-1.
Discoidals n12-86.
Distribution in Wisconsin o8-139; n5-64.
Disks, cache, flint, Wisconsin n22-3.
Ohio chert n17-45.
Copper, Wisconsin n30-51; n30-63.
Stone n17-9.
Dodge County, Wis.
Archeological remains n34-181.
Effigy mounds n35-77.
Drummond-Schaumberg effigy mound group n36-57.
Excavations at Prawatschke mound group n37-58.
Oak Grove effigy mounds n37-75.
Prehistoric works n43-107.
A preliminary report of the Hahn and Horicon sites (Vol. 39, No. 4 - Complete Issue)
Truncated barb points n42-90.
Woodland pot n35-54.
Indian trails and villages--1834-1837 n39-127.

Door County o16-125.
Analysis of white kaolin pipe fragments from the Mero site n46-125.
Heins Creek site n50-1.
Porte des Morts Site n48-267; n51-191.
Toggle-head harpoon n45-99.
Douglas County n23-89.
Douglass, Andrew Ellicott o1-42.
Drills, reamers, Indian n24-25.
Drums, dream dance n13-86.
Wis. Indian n27-81.
DuBay Site, pipes and pottery n45-127.
Dunn County o13-60.
Early man in Wisconsin and subsoil archeology n37-33.
Earthenware See Pottery.
Earthworks, animal effigies, Wisconsin territory n11-1.
Antiquities, Wiskonsin territory n11-20.
Four Lakes Indian n18-14.
Winnebago o10-124.
Eau Claire County o13-60.
Effigy - a unique ceramic n35-53.
Hopewellian mound at Effigy Mounds National Monument, Iowa (See Mounds) n34-125.
Egypt antiquities n7-7.
Ellsworth, Wm. H. o16-115.
Eulrich garden beds county park project n15-19.
Falge, Louis o17-98.
Faunal remains, Millville site n50-93.
Fire-steels n10-95.
Fishing, Indian n7-61.
Flint artifacts, corner-tang n16-62.
Collection n26-82.
Disks, caches, Wisconsin n22-3.
Eccentric n21-3.
Knives o20-7.
Perforators, chipped, Wisconsin o8-37.
Scrapers o20-33; n1-58.
Spearpoint n3-95.
Flint Ridge, visit to n5-82.
Fluted axes--Ringeisen collection n36-25.
Fluted hammer n38-41.
Folktales (See Legends)
Fond du Lac County antiquities o14-1.
Cache, copper implements o13-97.
Early Indian memories n25-126.
Gravel pit burial n25-13; n28-43.
Red ochre site n46-143.
Food--aboriginal
Utilization of vegetation by Indians of the Great Lakes Region n35-59.
Fords, Indian, Rock River n15-69.
Four Lakes Indians o9-115.
Fox Indians, Bell Site, an early historic Fox village n44-1.

Fox Valley, archaeology, James Site n49-57.
Kimberly-Clark Site n49-149.
Fowke, Gerard n9-157.
Frauds, aboriginal pipes n15-49.
Artifacts n15-53.
Indian implements n9-151.
Relics n16-7.
Spencer Lake horse skull n45-115.
Frost woods mound group n35-53.
Fur trade, Wisconsin o17-55.
Garden beds, Eulrich County park project n15-19.
Stoneworks, Winnebago County n1-47.
Wisconsin o8-97.
Prehistoric, of Wisconsin and Michigan and the Fox Indians n40-1.
Geneva Lake Centennial n11-44, 55.
Gerend, Alphonse n22-13.
Glosemeyer Mound Group, Warren County, Mo. n39-144.
Goodwin-Gresham site, Iosco Co., Michigan n50-125.
Gorgets, W.H. Ellsworth collection o1-37.
An engraved marine shell gorget in Wis. n41-69.
Gouges, stone o20-83.
Grand Spring n24-78.
Grant County o15-177.
Millville site n50-37; n50-88; n50-93; n50-109.
Prehistoric tragedy n28-45.
Green Bay, west shore o11-125.
Green Lake County, western n11-100.
Grooved Axes:
Some varieties in the Woodland area n37-46.
Guth, Alexander C. n24-83.
Hahn and Horicon sites--a preliminary report
(Complete Volume 39, No. 4)
Harpoon, Toggle-Head
Another toggle head harpoon from Door County n45-99.
Hastings Campsite n42-157.
Headdress, raven from Sauk County n43-87.
Heins Creek Site, Door County n50-1.
Herbs, uses by Wisconsin Indians n42-97.
Hi-Lo Site, Michigan n44-87.
Heller Mound group n34-144.
Historic American buildings survey n18-121.
Hobby Show, Milwaukee n19-95.
Hoe, notched n42-57.
Hollister, Orra L. n23-129.
Hopewell n9-106; n27-1.
And Cahokia cultures in Wisconsin n9-160.
Trait lists and culture n30-65.
Climatic change: a contributing cause of the growth and decline of Northern Hopewellian culture n41-21.
Climatic change and the decline of Hopewell n51-57.
Hopewellian Mounds n34-125.

Hoy, Philo Romayne o1-85.
Huebschmann, Dr. Francis, Indian agent n25-20.
Illinois archaeology society n17-90.
  Summary n28-19.
  Survey n6-56.
Illinois, Cook County, Palos site n50-184.
  Merrigan Mound, pioneer archaeology n51-49.
Implement, bone, Oshkosh Public Museum n23-25.
  Millville site, Middle Woodland village n50-88.
  Sheboygan n10-121.
  Cache o6-47.
    Copper n21-34.
    Fond du Lac o13-97.
  Checklist, Wisconsin Indian n8-81.
  Copper o1-55; o3-49; n2-178; n10-72.
    Collection o20-27.
    M.P.M. o1-11.
  Indian n7-91; 28-14, 40, 57, 76.
    Frauds n9-151.
    Manufacture n9-177.
  Obsidian o2-95.
  Occurrence and use of bone, shell, hematite and lead, Wis. o9-11.
  Primary flake n29-23.
  Stone, fluted n7-219.
    Knobbed o12-96.
    Geo. distribution o12-23.
    Crude, Congo Free State o7-111.
  Superimposed aboriginal n10-89.
  Trade o17-61; o18-16.
  Wisconsin o9-15.
Indi-Eiken n19-56.
Indian Agency House, preservation of n10-77.
Indian figurine found n35-49.
Indian Land Cessions, Wisconsin n16-53.
Indian Landmarks Comm. meeting 1922 n1-56.
Indian life
  Adopted Indians n26-35.
  Butterflies n24-1.
  Costumes n18-1.
  Herbs, uses of by Wisconsin Indians n42-97.
  Impact of war n25-10.
  Laws n24-33.
  Minnesota n14-9.
  Sugar-bush ceremonials n11-172.
  Today n20-14.
  Use of earthenware vessels by Northwest n8-69.
  Virginia n11-91.
  Wisconsin
    Cultural changes, French contact period n30-1.
    Dental remedies n46-177.
  Farming o18-19; n6-115.

Fishing n7-61.
Land cessions n16-53.
Prehistoric cultures n30-36.
Uses of woods and bark n11-148.
In an urban situation n36-147.
Indian place-names in Wisconsin Vol. 33-1 and 2 (complete).
Indiana archaeology n6-92.
Indians, indebtedness to o14-64.
No good, but dead n14-97.
Iowa archaeological survey, methods, results n8-135.
Iowa County, Wis.
Prehistoric earthworks n37-135.
Ioway focus, extension of n16-60.
Iroquois aspect, preliminary report, Wisconsin n28-34.
Isle Royale National Park o10-73; n15-12.
James Site, Winnebago County n49-57.
Jefferson County
Fluted point n42-133.
Juneau County o17-107.
Petroglyphs n28-51.
Kannenberg, Arthur P. n26-55.
Work at Lasley Point site n26-50.
Kansas archaeological survey n20-9.
Kellogg, Louise Phelps n9-147; n23-87.
Kenosha County, Hastings Campsite n42-157.
Kentucky n11-41.
Ancient buried city n13-25.
Ancient copper hoard n18-108.
Kettle Moraine State Forest n19-4.
Kickapoo Indians:
First one hundred years of white contact in Wisconsin n38-61.
Kings Mountain, battle of, anniversary celebration n9-187.
Oklahoma Kickapoo: ethnographic reconstruction n45-1.
Kickapoo reservoir, archaeological research n46-1.
Kimberly-Clark Site, Winnebago County n49-149.
Kingston, finds near n1-24.
Knives, ceremonial o13-176.
Chipped flint and quartzite o20-7.
Copper n9-145; n10-111; n13-32; n19-16.
Kohler, Marie C. n24-82.
Kolterman mound group
Salvage operations n36-3.
Radiocarbon date n37-133.
Koshkonong, pilgrimage o15-200.
Kouba Site, Wisconsin n47-171.
Cache of Paleo-Indian gravers n48-261.
Kraske village site and mound group n39-181.
Kumlien Centennial n24-68.
La Crosse County notes o11-97.
Midway Site n51-79.
Lac Court Oreilles region o14-41.
Lake Poygan Indians n10-102.

Lakes, Beaver n10-7.
Beaver Dam n1-7.
Chetek o16-83.
Como n7-129.
Delavan n6-7.
Eau Claire, mounds n46-221.
Fox o20-111.
Geneva n6-113; n7-129.
Green o16-1.
Kegonsa, region n4-181.
Koshkonong o7-47.
Little Green n6-120.
Lake Michigan basin
Late archaic culture and the Algoma Beach n39-175.
Lake Mendota
Six Mile Creek--a non-pottery site n40-19.
Minocqua n3-41.
Monona n1-119; n30-22.
Wild Life Sanctuary Assn. field meeting n6-110.
Some points from Lake Monona n37-85.
North n10-7.
Pike n6-41.
Pine n10-7.
Poygan, Waushara Co.
Upper Mississippi pottery n39-149.
Rice o16-83.
Rock n5-107.
Underwater search n43-70.
Senator Lake site n43-94.
Shawano, and Wolf River o16-57.
Wingra o14-75.
Lamb Site, Saint Croix County n49-1.
Langlade, Sieur Charles de n11-143.
Lapham, Increase A. o1-32.
Centenary o9-113.
Eighty years after n12-48.
Geologist n16-79.
Letters n16-85.
Research medal n5-49.
Wisconsin centennial n16-30.
Lapham Research Medal, history n49-99.
Lapham Medalists n41-19; n47-94; n47-97; n49-102.
Lapham, Julia A. o20-26.
Lasley Point site n26-50.
Lathrop, Stanley Edwards n7-114.
Lawson, Publius o20-13.
Legends n7-223.
Cave n18-59.
Copper n20-35.
Fire n20-84.
How stars were brought back to valley n19-93.

Indian corn origin n21-19.
Iron n22-9.
Island Park n19-90.
Ojibwa n1-28.
Rain n24-27.
Social significance of n25-136.
Stockbridge n7-228.
Tewa n7-116.
Thunderbird, of post n9-128.
Tree n19-30.
Winnebagoland n1-66; n20-31.
Winneboujou n9-130.
Winter n22-49.
Wisconsin Hills n18-17.
Rocks n19-7.
Springs n18-79.
Waterfalls n18-110.
Young hunter's blessing o20-94.
Lemere, Oliver n9-175.
Leonard, Wm. Ellery n25-135.
Lithic laboratory n20-75.
Logan Museum--Beloit, Wisconsin
Albert Green Heath Collection n37-51.
Lost art, never was lost n8-39.
Lotz, Louis n2-175.
Lover's leaps, Indian, Wisconsin n17-84.
Lyman, Francis H. n3-29.
Mandan, Huff n9-120.
Reconstructed village lodge, N.D. n18-29.
Village site o7-122.
Mandoka n14-41.
Manitoba, Canada
Scottsbluff projectile point n47-1.
Manitous, Fox n20-57.
Manitowoc County o14-121.
Maps, cartographic symbols for archaeological survey n8-129.
Marinette County o17-33.
Marker, West Point o13-101.
Marquette County
Prehistoric earthworks near Montello n43-108.
Material Service Quarry Site, La Salle County, Illinois n46-140.
McKern greeting n25-22.
Medals, Cornplanter o18-108.
Geo. Washington n7-115.
Indian n1-65.
Oshkosh Public Museum n16-97.
Wisconsin 13-28; o17-22.
King George II n16-4.
Lapham n5-49; n14-87.
Lincoln n8-103.
Lion and wolf n5-63.

Menomini n14-95.
Medicine, explanation n21-35.
Medicine Rock n18-35.
Memorials, Allouez o20-90.
Preservation of Indian o20-149.
Menominee, Wis.
Wakanda Park mound group (Dn1) n40-95.
Menomini, collecting among n3-135.
Concept of conservation n16-105.
Native plants used by n3-24.
Place names o18-97.
Recollections of ethnologist o20-41.
Religion n4-166.
Sawmill n32-39.
Mero Site, white kaolin pipe fragments n46-125.
Messmer, Archbishop Sebastian G. n9-174.
Metal, analysis of ancient Sinhalese n3-133.
Red n10-69.
Michigan, Houghton County, three unusual copper implements n50-26.
Menominee County, Backlund Mound Group n49-34.
Iosco County, Goodwin-Gresham site n50-125.
Michigan, northern, village and camp sites n9-180.
Michigan State Archaeological Society n3-26.
Survey o1-14.
Midway Site, La Crosse County n51-79.
Midwest Museums Conference 1927 n6-90.
Millville Site, Grant County n50-37; n50-88; n50-93; n50-109.
Milwaukee County o15-23.
Gravel pit burial n34-122 (see burials).
A brachycephalic cranium from Brookfield n37-73.
Indian burial n41-71.
Milwaukee Midsummer Festival Indian Village, 1941 n22-15.
Minnesota, archaeological remains in Kanabec County n6-64.
Mirror, bronze, Carthage n5-32.
Miscellaneous:
Early Man in Wisconsin n37-33.
Role of the non-professional in the local society n37-82.
Jerrard letter n38-29.
Killed by an arrow n38-58.
Plea from society president n40-268.
Naming a Chippewa child n39-120.
Mississippi cultures, history n24-33.
Climatic episodes and dating of Mississippian cultures n46-203.
Mesh spreader with Upper Mississippi cultural affiliations n45-101.
Middle Miss. peoples n27-25.
Upper Miss. peoples n27-10
Missouri, archaeological activity n16-1.
Mitchell Park site n14-21.
Mitchell, Stephen Decatur n5-87.
Monroe County o11-97.
Monuments, aboriginal, Mukwonago o2-8.

Preservation of Mexican and Central American n1-63.
Morrow Site, Indiana
Red ochre workshop n45-151.
Morse Site, red ochre cemetery n45-79.
Mound builders n10-80.
Tomb, Dickson n8-29.
Mound exploration, present condition, Wisconsin o1-6.
Mound relics, suggestions of Mexico o8-65.
Mounds o1-6; o9-52.
Achen n26-40.
Arnett Mound, Fulton County, Illinois n46-167.
Aztalan Vol. 39, No. 1.
Backlund Group n49-34.
Bedora group n35-74.
Beloit College Mound Group (Ro 15) n43-57.
Beloit n18-119; n39-155; n51-37.
Big Bend, Waukesha Co., Effigy Mounds n43-42.
Bird, fork-tailed n15-36; Joedicke n36-103.
Brugger o20-29.
Buffalo Lake n6-75.
Cahokia n1-25; n13-7.
Cassville o15-193.
Cutler, Waukesha o1-41.
Dane County n36-53.
Early salvage excavations in Madison area n47-101.
Dane County mounds and skeletal material n47-131.
Delavan Lake n4-124; n4-157.
Destruction of n20-54.
Southern state n13-94.
Devils Lake State Park n36-12.
Dodge County:
Effigy mounds n35-77.
Drummond-Schaumberg effigy n36-57.
Prawatschke group n37-58.
Oak Grove effigy n37-75.
Prehistoric works n43-107.
Effigy mounds in Richland County n34-168.
Eau Claire Lake n46-221.
Effigy o13-182; o20-35; n11-1; n13-84.
Airplane view n6-105.
Goose n20-50.
Northern Illinois o17-19.
Trait list n30-39.
Erickson Group n42-88.
Florida burial n10-123.
Fox Island, Rest Lake, Vilas County o2-14.
Frost Woods group n35-43.
Hagner n23-1.
Heim n18-39.
Heller group n34-144.
High Cliff n28-1.

Hoard n24-73; n25-4.
Hopewellian n34-125.
Horicon n17-55.
Indian Hill o13-93.
Intaglio o9-5; o19-197.
Iowa County n37-135.
Joedicke Bird n36-103.
Juneau County n17-88.
Kentucky n13-25.
Kingston n1-22.
Kolterman group n36-3; n37-133.
Kraske group n39-181.
Lake Mendota o11-7
Lake Waubesa o12-107
Lasley Point n19-42; n21-29; n23-32, 37.
Lizard Mound State Park--unique display of skeleton n41-53.
Lynx o20-96.
MacGregor Bay Cemetery n10-61.
Man o6-45; o7-139.
Marquette County, Montello n43-108.
Mendota Hills bird effigy, Dane Co. n36-53.
Merrigan Mound, Illinois, pioneer archaeology n51-49.
Minnesota, Nett-Rainy Lake region n7-221.
Monona n24-78; n25-5
Nelson Dewey Memorial State Park n20-29.
Oak Grove effigy, Dodge Co. n37-75.
Observatory Hill o13-90.
Panther, curve-tailed n16-10.
Pecatonica River o9-117.
Pleasant Lake n12-111; n15-74.
Plum City n4-153.
Portage Co. site report n42-57.
Portage group n45-144.
Potato Lake, Rusk County o11-93.
Prawatschke Woodland burial complex n37-87.
Prawatschke group excavation n37-58.
Quinney, panther mound n44-212.
Richland County effigy n34-168
Rockford n8-35
Rush Lake effigy n39-13(
Sawyer County n43-2[illegible]
Serpent
Medicine Butte n14-23.
Menasha o1-35.
Vilas County n28-54.
Shawano County o18-105
Springdale n34-165
State Fair Park o9-79; n22-19
State-Line Mound Group, Beloit n49-109.
Turtle Creek o12-7
Uses of n3-98.

Vonburn, Prairie du Sac o1-93.
Wakanda Park, Menominee n40-95.
Warnke mounds, Portage County n37-25.
Waubeka n28-63.
White's group, Vernon County o12-30.
Winnebago o9-101; n8-106.
Wisconsin state parks n15-1.
Wood County n17-88.
Wyalusing State Park n32-97.
Mukwonago, aboriginal monuments o2-8.
Museums
American Museum of Natural History, archaeological materials from Wisconsin in o6-20.
Dwight Foster Historical n17-67.
Exhibits n25-98.
Field of small n25-98.
Ft. Atkinson, Lawton and Lee collections n21-14.
Geological n20-81.
Historical, meeting n21-76.
Kohler n9-143.
Log building, of Wisconsin n24-46.
Neville Public
Archaeological research n26-60.
Old Copper collection n48-81.
Wax and fiber process of pottery restoration n25-16.
New Wisconsin n19-25.
Origins in Milwaukee n12-54.
Oshkosh Public n23-19.
Bone implements n23-25.
Medals n16-97.
Shell work n23-28.
Outdoor, Clintonville n16-28.
Robberies n4-169.
Wisconsin's, 1941 n22-45.
Museums Assn. Conference, Michigan-Indiana-Ohio, 1939 n20-46.
Myths (See Legends)
Names, family, civilized Indians n8-36.
Indian, Wisconsin lakes n4-164.
Menomini Indian place, in Wisconsin o18-97.
Where Wisconsin originated n26-84.
Indian Place-Names in Wisconsin Vol. 33 - 1 and 2.
Nation of the Three Fires o18-109.
Navaho, life and customs of, women n18-100.
Nebraska archaeology n13-1.
Evaluation of recent finds attributed to Pleistocene n13-49.
Necklace, comparison between an Aurignacian and a Magdalenian, Dordogne district, France n5-58.
North Dakota, progress in n20-77.
Old Copper artifacts n49-125.
Obsidian, implements in Wisconsin o2-95.
Oconto, Wis.

Bedora mound group n35-74.
Oconto site--The age of the Oconto site n43-16.
Oconto site--An old copper manifestation n33-199. n38-222.
Oconto site--Radiocarbon date n51-77.
Oconto site--Radiometric analysis of bone material n43-31.
(See Copper)
Ogden-Fettie Site, Illinois, shark tooth n45-156.
Ohio--preservation of archaeological and historical sites o19-16.
Ojibwa Informant: John Mink n36-106.
Oneida County n3-52.
Historic Indian burials n49-96.
Oneida, Wisconsin, wake n22-1.
Oneota
Midway village site n51-79.
Porte des Morts site, Door County n51-191.
Radiocarbon dates n46-203.
Settlement patterns and agricultural patterns in Winnebago Co. n47-188.
Ontario, Canada
Copper artifacts from Western Ontario n46-223.
Copper "Gaff Hook" from Ontario n48-345.
Ornaments, copper o3-101.
Bird effigy n11-104.
Fluorspar n16-25.
Indian trade implements o17-61.
Silver, Grand Butte n10-91.
Osceola site: near Potosi, Wis. n27-53.
An old copper site n38-186.
Oshkosh, Chief Reginald n16-100.
Relics n19-69.
Otoliths--as ornaments n33-223.
Outagamie County antiquities o15-1.
Villages n13-71.
Ox-Bow site
Testing operations n37-131.
Ozaukee Co.: red ochre burial n39-115.
Dickmann site, a campsite in Cedarburg Township n45-175.
Paleo-Indian Site
Hi-Lo Site, Michigan n44-87.
Kouba Site, Wisconsin n47-150; n48-261.
Two Late Paleo-Indian complexes in Wisconsin n44-199.
Palos site, an early historic site, Cook Co., Illinois n50-184.
Parker, George n17-91.
Pathology, vertebral, of prehistoric Wisconsin Indians n10-105.
Pendant, shell effigy n1-19.
Pepin, Armstrong site; an upper Mississippi site at, Wisconsin n30-79.
Perforators, chipped flint, Wisconsin o8-37.
Pestles, stone n3-7; n15-41.
New York n10-74.
Petroglyphs
Buffalo County n34-207.
Juneau County n28-51.

Mouth of Lemonweir River n17-75.
Pictographs n9-123.
Roche-A-Cri State Park n46-191.
Hanson, Vernon County n41-98.
Wisconsin petroglyphs and pictographs n31-83.
Peyote cult n29-28.
Pictographs, Juneau County n28-51.
Ontario n18-28.
Petroglyphs n9-123.
Pictographs in the Lakehead region n42-165.
Picture writing, Chippewa n6-80.
Pike, copper n5-66.
Greater n12-31.
Pipes, aboriginal o4-47.
Fraudulent n15-49.
Analysis of white kaolin pipe fragments from the Mero site n46-125.
Calumet o10-5.
Disk o13-103.
DuBay site n45-127.
Human effigy o1-92.
Minnesota copper n7-128.
Peace, ceremony passes n25-97.
Platform o7-34; n26-44.
Effigy n8-13.
Stems n1-62.
Three unfinished n1-57.
West collection o12-64.
Monograph n14-31.
Pipe Site n42-174.
Plant remains, Bell Site n44-70.
Plant food remains from Wisconsin n47-196.
Plants used by Bois Fort Chippewa in Minnesota n7-230.
Chippewa n21-8.
White Mt. Apaches in Arizona n8-143.
Plum City n4-153.
Plummets, distribution in Wisconsin o8-139; n5-64.
Ornamental stone o20-28.
Points, arrow, angular barbed o20-18.
notched chipped n17-81.
triangular n19-59.
Arrowhead art n15-60.
Clovis and Sandia-like Points from Dane County n51-35.
Folsom, controversy n14-27.
Fluted point from Jefferson County n42-133.
Harpoon, native copper n7-50.
More truncated barb-points from Wisconsin n42-155.
Scottsbluff point from Manitoba n47-1.
Spear, copper n13-15; n18-73.
Tooth shank n18-77.
Flint n3-95.
Notched chipped n17-81.

Surface collection of truncated barb and bifurcated base points from central Illinois n47-203.
Truncated-barb points n42-90.
Truncated barb points from Northeastern Illinois n43-9.
"Turkey tail" n9-99.
Turkey-tail point, distributional study n48-3.
Two Late Paleo-Indian complexes in Wisconsin n44-199.
Unusual Old Copper point n48-1.
Wisconsin fluted points n50-189.
Yuma n15-45.
Folsomoid points, Richland County n35-79.
Polk County n29-1.
Port Washington, an old copper site? n38-1.
Portage County o11-39; o12-87.
Bigelow site n50-215.
Mounds n45-144.
Site report n42-57.
Warnke mounds n37-25.
Porte des Morts Site, Door County
North Bay Component n48-267.
Oneota component n51-191.
Potawatomi o19-41.
Prairie n4-160.
Trip to n3-143.
Pots (See Pottery)
Potsherds (See Pottery)
Pottery, aboriginal, Wisconsin o1-96; o4-19; n12-89.
Aztalan, analysis of sherds n47-12.
Aztalan shell-tempered pottery n51-1.
Black River site o20-93.
Ceramic relationships of four Late Woodland sites in Ohio n45-160.
Ceramic repository, University of Michigan n8-20.
DuBay site n45-127.
Early Woodland vessel from Wisconsin n45-158.
Importance in Wisconsin archaeology n8-126.
Mimbres Valley, N.M. n11-82.
Northwest Indians n8-69.
Panama n13-98.
Potsherds, Lake Michigan shore o4-3.
Restoration process n12-81.
Neville Public Museum n25-16.
Restoration n38-43.
Smoothers n9-171.
Textile imprints n27-71.
Vessel, Hamilton collection o1-10.
Winnebago n19-1; n22-84.
Spoons and dippers n19-21.
Winnebago County n8-124.
Waushara Co.: Lake Poygan: Upper Mississippi pottery n39-149.
Wayne Ware n47-208.
Prehistoric industry, Franco-American study o9-35.
Prehistoric specialization n14-15.

Price Site, Richland County n47-33; n47-76.
Quarries, catlinite o13-80.
Pipestone, Barron County o9-31.
Racine County o3-6.
Radiocarbon dates for Wisconsin n41-65.
(See Carbon -14 Dates)
Radiometric Analysis
Oconto Site - radiometric analysis of bone material n43-31.
Radke-Dunham site: Radke area n38-5.
Circular fire pit--Dunham area n40-121.
Rainy Lakes Indians n2-140.
Reamers, Indian, drills n24-25.
Red Ochre:
Burial in Ozaukee County n39-115.
Beads from red ochre burial n40-25.
Culture--an early burial complex in northern Indiana n41-35.
Morrow Site, Indiana - red ochre workshop n45-151.
Morse site - a red ochre cemetery n45-79.
Significance of some red ochre-like artifacts from Lake County, Indiana n43-1.
Site in Fond du Lac County n46-143.
Reigh Site:
Winnebago County, burial complex n35-1.
Additional material from Reigh site n37-28.
Reigh site report No. 3 n37-97; n38-278.
Eskimo at Reigh site n38-30.
Burial complex of the Reigh site n38-244.
Relics, Chief Oshkosh n19-69.
Suggestions of Mexico in mound o8-65.
Restoration, projects for, of sites and structures of history or archaeological importance n16-74.
Richland County
Effigy mounds n34-168.
Folsomoid points n35-79.
Price site, burials n47-33; n47-76.
Rings, finger, Indian trade n24-7.
Riverside Site, Michigan n48-145.
Robberies, museum n4-169.
Roche-A-Cri State Park, petroglyphs n46-191.
Rock paintings, Mayville Indian n30-73.
Rock river, Indian village and camp sites, lower, Wisconsin n9-7.
Winnebago village and chieftains n2-125.
Rock shelter, Brown County n25-90.
Cave in France n3-14.
Raddatz, Sk5, Wis. n40-33.
Geology of Raddatz rockshelter, Sk5, Wis. n40-69.
Animal remains of Raddatz rockshelter n40-83.
Archaeological studies of four Wisconsin rockshelters n40-137.
Animal remains from Durst rockshelter, Sauk Co., Wis. n41-11.
Rocks, guide to, and minerals used by prehistoric Indians in Wis. area n25-76.
Rubbish n12-90.

Rush Lake - an effigy mound n39-130.
Rusk County o13-60; n29-1.
Saint Croix County--Lamb Site n49-1.
Sandstone, Hixton silicified n42-78.
St. Marc, Mission of n14-1.
Satterlee, John Valentine o19-209; n1-60.
Sauk County
Raven Headdress n43-87.
Summary of archaeology, eastern o5-230.
Western n1-81.
Survey work report n11-67.
Sauk war bundles n2-148.
Sawyer County
Occurrence of Indian mounds n43-25.
Scrapers, flint o20-33; n1-58.
Seed analysis in archaeology n51-163.
Senator Lake Site n43-94.
Shark Tooth, Ogden-Fettie Site, Illinois n45-156.
Shawano County o18-105.
Sheboygan County o1-61; o19-121.
Shell heaps, clam eaters, Winnebago County o2-6.
Literature on Wisconsin, and artifacts n17-20.
Shells, aboriginal uses n17-1.
Beads n8-32.
Decorative uses n25-112.
Marine, on Indian sites, Wisconsin o12-53.
Serrated, Winnebago n20-23.
Shellwork, Oshkosh Museum n23-28.
Shrines, Mihi n17-93.
Sioux, evidence of ancestors of Chiwere, outskirts of Milwaukee n27-89.
Habitations in Minnesota o7-155.
Skavlem, Halvor Lars n19-47.
Skeletal remains, importance in Wisconsin archaeology n8-14.
Bell Site n44-72.
Dane County effigy mounds and Burton site n47-131.
Human skeletal material from the Millville site n50-109.
Old Copper crania n43-13.
Price Site III, RI 4, analysis n47-76.
Skin dressing, aboriginal n19-76.
Chippewa Indian method n28-6.
Skulls, perforated n14-37; n24-49.
Remains, importance in Wisconsin archaeology n8-14.
Smith, Huron Herbert n12-69.
Smoothers, pottery n9-171.
Society of Dreamers and the O-ge-dah, or Head-Men Dance of the Bois Fort Chippewa Indians of Nett Lake, Minnesota n13-35.
South Dakota, evidence of Old Copper Culture n44-97.
Spade, stone, hoes n2-165.
Spencer Lake horse skull n45-115.
Spirit stones o7-165; o20-87; n2-176; n13-18.
Sponge divers ceremony n7-117.

Springdale mounds n34-165.
Springs, blue n22-7.
Sacred, Lake Poygan region n7-211.
Spirit n7-215; n19-74.
Spud, fluted copper n21-65.
Stone o2-15; n5-79.
Stockaded village n8-61.
Stockbridge Indians
History of Wisconsin Stockbridge n49-81.
Stoneworks, garden beds in Winnebago County n1-47.
Strong, Moses o2-4.
Subsoil archeology n37-33.
Superstitions and derivations n17-62.
Tanning (see Skin Dressing)
Taylor County o11-91.
Tennessee archaeology at St. Louis, Thruston exhibit o3-133.
Textiles, cloth weaving of Dakota n3-22.
Imprints on Wisconsin Indian pottery n27-71.
Weaving technique of Winnebago bags n12-33.
Thompson, Orrin n15-10.
Thwaites, Reuben Gold o12-93.
Tobacco, uses of, by Wisconsin Indians o10-5.
Tools, aboriginal discrimination in selection of materials for o7-125.
Indian stone cutting n6-88.
Odd Indian n12-128.
Turquoise mines, prehistoric n8-100.
Totem poles and totemism n19-17.
Totten site, Walworth County
A possible non pottery site n40-116.
Trade material, beads o7-116; n9-109.
Canadian trade silver from Indian graves, northern Illinois n51-21.
Crosses, silver o9-104.
Finger rings n24-7.
Grignon-Porlier Post n21-71.
Implements and ornaments o17-61; o18-16.
Trade silver and Indian silverwork n34-1.
Trail marking trees n21-48.
Trails, Black Hawk, study asked n25-96.
Brule-St. Croix portage n14-34.
Chicago-Milwaukee, Green Bay n9-103.
Indian overland travelways n9-114.
Pierce County n6-53.
Trait lists, effigy mound aspect n30-39.
Prehistoric Wisconsin cultures n26-66.
Some comments on, Hopewellian culture n30-65.
Trees, Trail Marker n46-183.
Trail marker tree at Twin Lakes n46-189.
Tree ring record, forgotten n14-45.
Trempealeau County o11-86.
Turtle Creek site o12-7.
Tyler, Willis E. n25-3.
Urn burials in Alabama n9-110.

Utah, ancient, people believed snakes evolved from animal n15-44.
Archaeological finds in Uintah Basin n11-162.
Bear Dance of Ouray Utes n9-148.
Brush Creek region, archaeological notes, northeastern n10-132; n15-23.
Vandalism check, Arizona n14-43.
Vernon County o11-86.
Archaeological research in the projected Kickapoo reservoir n46-1.
Vertebrate remains from the Bell Site n44-58.
Vilas County n3-52.
Virginia Indians n11-91.
Walworth County, the Totten site n40-116.
Waukesha County
Effigy mound at Big Bend n43-42.
Wapuka, dedicating site n14-89.
War bundles, Sauk n2-148.
Washburn County o4-35.
Washington Island o13-157.
Water monster inhabited lakes and streams in Wisconsin n17-27.
Watertown village site n5-51.
Waukesha County, aboriginal monument at Mukwonago o2-8.
Aboriginal occupation in Pewaukee township o8-81.
Antiquities o6-11.
Northern townships n2-7.
Southern townships n2-69.
Waushara County o15-113.
Weights, pebble net o7-131.
West, George A. n18-69.
Collection of aboriginal pipes o12-64.
Pipe monograph n14-31.
Testimonial meeting n14-49.
What a season brings forth n11-157.
White Feather burial n5-29.
Winnebago County o2-40; n1-61.
Bell Site n44-1; n44-58; n44-70; n44-72.
Campsite n10-54.
James Site n49-57.
Kimberly-Clark Site n49-149.
Oneota settlement and agricultural patterns n47-188.
Village Site n8-94.
Winnebago Indians o6-78; n2-173.
Birds as food n25-95.
Builders of Wisconsin earthworks o10-124.
Change in child care patterns n29-39.
Cultural change n25-119.
Medical technique n34-139.
Painted and incised pottery fragments n22-84.
Painted pottery n19-1.
Prehistoric, culture pottery n19-21.
Serrated shells n20-23.
Village and chieftains, Lower Rock River region n2-125.
Weaving technique n12-33.

Wisconsin, northeast o11-107.
Northwest o13-7.
Western o4-25.
Wisconsin antiquities, Indian authorship of o6-169.
Record o5-289; o7-1; o8-113; o10-165; n4-9.
Wisconsin archaeological parks, post-war program n25-1.
Wisconsin Archeological Society, articles of incorporation, by laws o13-108; n25-25.
Assembly, Madison o9-57.
Field assembly, Carroll College, 1906 o6-1.
Field work, 1939 n20-69.
Joint meeting, Wisconsin scientific societies o7-107; n5-56; n21-5.
Laws relating to appropriation to, 1943 n25-129.
Meeting, Manitowoc, 1912 o11-61.
Prairie du Chien, 1911 o11-105.
Ripon, 1931 n10-116.
1945 legislative session n26-58.
Recent achievement o5-182.
Retains name of Lapham's Peak n24-80.
Silver anniversary celebration n5-47.
State fair exhibit 05-201.
University summer session excursion, 1914 o13-106.
Women contributors n21-51.
Wisconsin Archeological Survey n11-57; n29-18.
Conference n3-28.
1923 n3-31.
1925 n5-30
1929 n9-154
1940 n22-89
Report of committees o11-147; n11-61.
Wisconsin archaeology
Codification of archaeological sites n46-148.
Contemporary scene n17-34.
Findings, 1943 n25-7.
In light of recent finds in other areas n20-1.
Investigations, 1935 n16-17.
Materials in AMNH o6-20.
Progress o7-109.
Research n12-1.
Suggestions o6-70.
Wisconsin Field Archaeology Act of 1965 n47-87.
Wisconsin joins ranks of oldest inhabited areas in America n17-51.
Wisconsin landmarks o12-98.
Wisconsin tercentenary n13-81.
Wisconsin valley, upper, aboriginal remains o12-75.
Wisconsin War History Commission o17-46.
Wood County o11-39.
Woodland
Ceramic relationships of four sites in Ohio n45-160.
Early Woodland vessel from Wisconsin n45-158.
Site in Canada n43-52.
Village site, Millville site, Grant County n50-37; n50-88; n50-93; n50-109.

Woodland pot from Dodge County n35-54.
Woodland burial complex
Prawatschke mound group n37-87.
Wyoming, archeological work o7-119.

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